THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS REVIEW, COPPER AND BRASS

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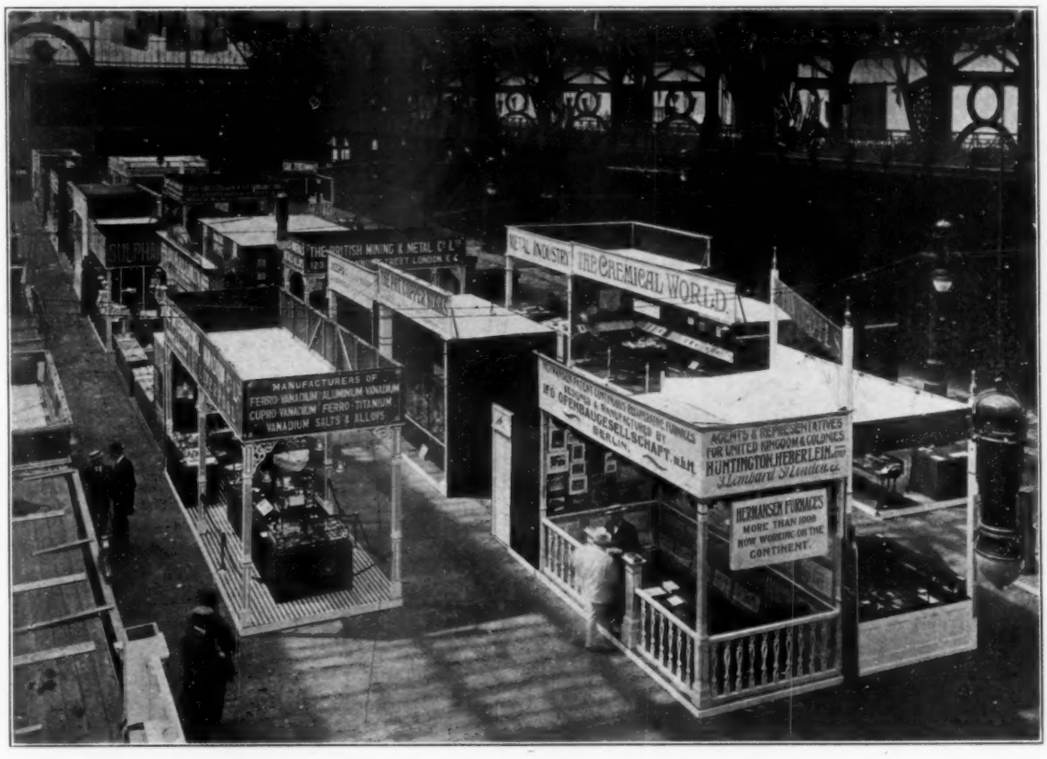
THE FIRST EXHIBITION OF METALS

MANUFACTURERS OF METALS AND METAL PRODUCTS DISPLAY THEIR WARES IN AGRICULTURAL HALL, LONDON, ENGLAND.

Great Britain as an industrial nation is not as yet played out, was the keynote of the sentiment back of the first Exhibition of Metals ever held in the world, and which opened for two weeks in the Royal Agricultural Hall, London, on June 15, 1912.

"We will show the world what old England can do in metal manufacture," was the expression of the speaker. "For as we have been making brass for centuries, why not let our metal arts be known?"


THE CHEMICAL WORLD
MANUFACTURERS OF
FERRO VANADIUM ALUMINUM VANADIUM
CUPRO VANADIUM FERRO-TITANIUM
VANADIUM SALTS & ALLOYS
AGENTS & REPRESENTATIVES FOR UNITED KINGDOM & COLONIES
HUNTINGTON, HEBERLEIN & Co
Leonard House
HERMARSEN FURNACES
MORE THAN 1000 NOW WORKING ON THE CONTINENT.

GENERAL VIEW OF THE EXHIBIT IN AGRICULTURAL HALL.

For an undertaking which was the first of its kind ever held, the organizers and manufacturers certainly produced a very creditable display of metal manufacture in all forms from the cast to the wrought, and also a very good collection of machinery and appliances (still and in motion) for the fabrication of metals in all forms.

The show itself was opened with all the formality and decorum for which "Merrie England" is famous. The president and his chief councellors, arrayed in top hats and frock coats, paraded slowly through all of the aisles as the band played a welcoming air, and when this formality was over with, officials and guests filed their way to the dining room to partake of a course luncheon which was topped off with several hours of toastmaking and speech glorifying, beginning with a toast to "The King" and ending with a short address by the organizing manager, Frederick W. Bridges. The president, Sir Gerard Albert Muntz, Bart., in his opening address mentioned how the exhibition had justified itself and explained the meaning of the word non-ferrous, for Britons still cling to this clumsy distinction of metallic substances which are separated from the iron group, rather than to class metals simply as metals.

Sir Gerard was followed by other speakers who explained the purposes of the exhibition and proposed a vote of thanks to the president and organizers who had worked so painstakingly—really a labor of love—to make the exhibition a success. The speakers hoped that this first attempt was but the beginning, and they regretted that

manufacturers and students had not taken a greater interest in this beginning, but they believed that when they had seen what an excellent start the manufacturers and organizers had made, that in future years everyone would take a far greater interest and an active aid in metal exhibits. They should down the notion which seemed to be quite prevalent that other countries in the world were beating England in the manufacture of metals.

The exhibits were placed in a spacious, well-lighted building, and in some of the stands considerable pains had been taken to make them metallically artistic—a number of the booths being constructed entirely of wrought metals in all sorts of fantastic shapes.

In some of the stands were represented firms who had made metal manufacture in Great Britain famous for centuries, while others showed the products of comparatively new firms, and new metals, such as aluminum and its alloys. There was metal present everywhere in all

THE ARTISTIC STAND OF MESSRS. EARLE, BOURNE & COMPANY, LTD., LONDON, ENGLAND.

its forms from huge castings and forgings down to the minutest piece of metal known in the metallic arts.

The following is a list of the exhibitors and the principal features of their exhibits:

THE AEOGRAPH COMPANY, LTD., 43 HOLBORN VIADUCT, E. C.
Aerograph outfits for spraying stoving and other enamels, lacquers, etc.

THE ANGLO-FRENCH NICKEL COMPANY, LTD., HAFOD ISHA WORKS, SWANSEA.
Nickel and cobalt products.

THE ATLAS METALS & ALLOYS COMPANY, LTD., 52, QUEEN VICTORIA STREET, E. C.
Atlas and anti-friction metals.

BARKER & ALLEN, LTD., SPRING-HILL, BIRMINGHAM.
Fancy wires in German silver, brass and copper.

BENTON BROTHERS, RODLEY LANE FOUNDRY, SHEFFIELD.
One case of rough castings as under:—
1—1 card containing 6 gold and 22 silver castings.
2—1 board containing 64 pieces of rough castings, various metals.

THE BERNDORF METAL WORKS, BIRMINGHAM METAL WORKS, FREDERICK STREET, BIRMINGHAM.
This exhibit comprised pure nickel in anodes, sheets, wires and tubes. German silver, thio and alpacca brands, in sheets, wires, tubes, etc. Cupro-nickel sheets and electric resistance wires.

BETTS & COMPANY, LTD., 1, WHARF-ROAD, CITY-ROAD, LONDON, N.
Lead and tinfoil.

THE BIRMINGHAM METAL & MUNITIONS COMPANY, LTD., ADDERLEY PARK ROLLING MILLS, BIRMINGHAM.
An exhibit of firearms and accessories.

JAMES BOOTH & COMPANY, LTD., SHEEPCOTE STREET TUBE AND ROLLING MILLS, BIRMINGHAM.
A fine display of extruded metals.

SAMUEL BOOTH & COMPANY, CHEAPSIDE WORKS, BIRMINGHAM.
Plumbing, brass goods.

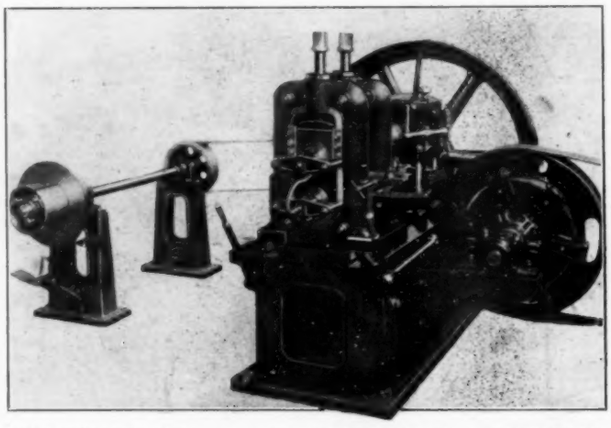
EARLE, BOURNE & COMPANY, LTD., HEATH STREET SOUTH, SPRING HILL, BIRMINGHAM.
This exhibit of sheet metals, tubes and wires was very artistically housed in a stand constructed entirely of metal.

THE BRITISH ALUMINUM COMPANY, LTD., 109, QUEEN VICTORIA STREET, E. C.
The British Aluminum Company's stand was remarkable for the versatility of its exhibits and the fact that they are all specimens of the same metal.

THE BRITISH MINING AND METAL COMPANY, LTD., 123, 125 & 127, CANNON STREET, E. C.
Bronzes and other alloys.

BUTLER JONES & SONS, 69, BASINGHALL STREET, E. C.
Cast brass name plates.

CHARLES CARR, LTD., WOODLAND WORKS, SMETHWICK.
Bell founders. Patent crucible melting furnace. Phosphor bronze—tin and copper.



COLD ROLLING MILL, 6 x 6 IN., MADE BY W. H. A. ROBERTSON & COMPANY, LTD., BEDFORD.

J. & A. CHURCHILL, 7, GREAT MARLBOROUGH STREET, W.
"The Chemical World," a journal published in the interests of metals.

ROBT. W. COAN, 219, GOSWELL ROAD, E. C.
General selection of aluminum castings.

COOKSON & COMPANY, LTD., NEWCASTLE-ON-TYNE.
This very old firm has an imposing exhibit of antimony, antimonial leads, type metals, etc.

DEWRANCE & COMPANY, 165, GREAT DOVER STREET, S. E.
Adhesion oil pumps, and patent absolute pressure gauge.

THE DELTA METAL COMPANY, LTD., DELTA WORKS, EAST GREENWICH, LONDON, S. E.

The Delta Metal Company, who are the original patentees and largest manufacturers of extruded rods, showed a very large assortment of their patent extruded rods and sections, including solid and hollow shaped bars, in brass, yellow metal, manganese bronze, naval brass, copper, various Delta metals, etc. Also numerous specimens of "Dixtrudo" high speed brass screwing and turning rods, "Dixtampo" yellow metal bars and bolts.

The Delta Metal Company's exhibit further consisted of various heavy forgings, also castings and stampings, as well as rods, tubes, wire and sheet, of Delta Metal high class engineering alloys, such as Delta Metal No. 1, a malleable bronze having a tensile strength of about 50 tons per square inch, and about 20 per cent. elongation; Delta Metal No. 2 (silver bronze) an improved German silver; Delta Metal No. 4, an acid-resisting malleable bronze as strong as steel and having the highest resistance to corrosion, etc.

Two large forgings of Delta Metal No. 4, one being a large collar shaft weighing about 35 cwts., the other a forged hydraulic duplex plunger (internal test pressure 4 tons per square inch) measuring about 11 ins. outside diameter by 6 ins. inside, and about 10 ft. 6 ins. long, rough turned and bored, and weighing about 23 cwts., shown by the Delta Metal Company, Ltd.

JOHN DUGDILL, JR., FAILSWORTH, NEAR MANCHESTER.

Patent movable electric fittings and automatic switches.

LEO EPPENHEIM, 31, DUKE STREET, ST. MARY-AXE.

Method for disposal or utilization of metallic scrap or waste products.

H. ERHARDT & COMPANY, LTD., 9-10, BOND COURT, WALBROOK, E. C.

Tin and tin-lead composition foils.

THE EYRE SMELTING COMPANY, LTD., BARDEN ROAD WORKS, TONBRIDGE.

"Eyre" Anti-friction Bearing Metal, for lining all classes of bearings, in ingot form, and also brasses of different descriptions lined with this metal; in addition to this, the "Eyre" Valve Metal is exhibited, this being especially suitable for lining slide valves, etc.

THE GLACIER ANTI-FRICTION METALS COMPANY, LTD., 112a, QUEEN VICTORIA STREET, E. C.

White metal alloys and die cast bearings.

D. W. GREENHOUGH & SONS, MINCING-LANE, E. C.

Magnesium and magnesium alloys.

G. D. GREENWOOD & COMPANY, 26, UFTON ROAD, DOWNHAM ROAD, N. E.

This exhibit consisted of "Mepo" aluminum solder, which is an entirely new and secret invention.

In addition to the solder itself, there were shown all kinds of work in aluminum soldered with this firm's speciality.

HILLE & MULLER, SCHONAU, NEAR SCHLUCKENAU, BOHEMIA.

Sole manufacturers of electro-plated steel stripes. They also displayed: Nickeled zinc sheets, brassed zinc sheets, tombacked zinc sheets, coppered zinc sheets, nickeled steel sheets, tinplates and brass sheets, and enamelled steel sheets. These are largely used in the manufacture of alarm clocks, accordions, ash trays, advertising pocket mirrors, buttons, buckles, etc. Also condenser tubes and pipes.

THE HOYT METAL COMPANY OF GREAT BRITAIN, LIMITED, 26, BILLITER STREET, E. C.

Babbitt metals, etc.

HUNTINGTON, HEBERLEIN & COMPANY, LTD., 3, LOMBARD STREET, E. C.

The drawings and models of the Hermansen Patent Continuous Recuperative Furnaces exhibited, show the application of the recuperation system to furnaces of any size and design, principally for annealing brass and copper tubes, sheets, wire, etc.; melting, hardening and reheating furnaces of all descriptions, besides all other types of furnaces used in the metal trades.

INSTITUTE OF METALS, CAXTON HOUSE, WESTMINSTER, S. W.

Fifty specimens from the Pathological Museum of Non-ferrous Metals and Alloys.

INTERNATIONAL VANADIUM COMPANY, LTD., 49-51, THE ALBANY, LIVERPOOL.

This exhibit comprised raw materials and manufactured products dealing with the metals vanadium, uranium and titanium.

GEORGE JOHNSON & COMPANY, MONTGOMERY STREET ROLLING MILLS, SPARKBROOK, BIRMINGHAM.

Manufacturers of Britannia, medal, albion, stencil, meter, electro-type and other white metals. Tea and laminated leads, tinfoils (plain, embossed, paper-backed and on reels), sheet tin. Tin and pewter sheets.

GEORGE JONES, LTD., LIONEL STREET FOUNDRY, BIRMINGHAM.

Electrically driven rolling mills.

A. JOSEPH, EARL STREET, LONDON ROAD, LONDON, S. E.

Buyers and sellers of all descriptions of scrap metals, turnings, sweepings, etc.

Good stocks held of Government gun metal, firebox plates, condenser and locomotive tubes, cupro (nickel) scrap, cartridge cases, etc.

THE LEAD WOOL COMPANY, LTD., SNODLAND, KENT.

Samples of various metals comminuted by the patented process in form of fibres, ribbons, and wools of various grades are shown, including lead, anti-friction metal, zinc, tin, copper, brass and aluminum.

E. LEITZ, 18, BLOOMSBURY SQUARE, W. C.

Microscopes and other instruments.

THE LIGHT ALLOY COMPANY, 7, QUEEN VICTORIA STREET, E. C.

Vanalium castings, sheets, rods and wires.

LOCKE, LANCASTER AND W. W. & R. JOHNSON & SONS, LTD., BRIDGE ROAD, LIMEHOUSE, E.

Lead in all forms.

MABOR LIMITED, 23, FITZROY SQUARE, W.

Cupels (single and multiple) for assaying precious metals.

"THE METAL INDUSTRY," 33, BEDFORD STREET, COVENT GARDEN, LONDON, W. C.
The English edition of THE METAL INDUSTRY had a display of useful industrial literature.

MUNTZ'S METAL COMPANY, LTD., FRENCH WALLS, NEAR BIRMINGHAM.
The exhibit of this very old firm included aluminum, mandrils, circular and straight, as used in the manufacture of brass bolts and nuts for engineering purposes, naval brass, Muntz's metal, manganese bronze, screwing metal, and a number of alloys were shown in the form of nuts, bolts, pump rods, and valve spindles.

H. OST & COMPANY, 59, MARK LANE, LONDON, E. C.
Carbon free metals and alloys.

THE P. R. T. COPPER WORKS, 83, GOSWELL ROAD, LONDON, E. C.
High conductivity copper wires and cables, French hard drawn turning brass, extruded sections. They also exhibited high conductivity copper commutators, lightning conductors, etc., phosphor bronze, and various copper alloys.

THE RAPID MAGNETTING MACHINE COMPANY, LTD., 18, THE CRESCENT, BIRMINGHAM.
Electro-magnetic separators.

THE RIBBON METALS SYNDICATE, LTD., 50, CITY ROAD, LONDON, E. C.
The exhibit of this firm comprised specimens of various metals, including gold, silver, copper, lead, zinc, tin, aluminum, solder, bismuth, cadmium, babbitts metal, and other anti-friction metals, in ribbon and strip form.

W. H. A. ROBERTSON & COMPANY, LTD., LYNTON WORKS, BEDFORD.
Wire drawing machinery, etc.

GEORGE SCHULTZE & COMPANY, 10, BUSH LANE, LONDON, E. C.
Flexible metallic tubing without seam or joint, or packing, of red bronze.

JAMES SMITHIES, MANCHESTER ROAD, WILMSLOW, CHESHIRE.
Metal craft in actual working.

THE SULPHALIUM METAL COMPANY, DOCK HOUSE, BILLITER STREET, E. C.
"Sulphalium," a new aluminum alloy.

THE TANDEM SMELTING SYNDICATE, LTD., MERTON ABBEY, LONDON, S. W.
Appliances for the reduction and refining of metals.

TAYLOR & CHALLEN, LTD., BIRMINGHAM.
Metal presses of all kinds, cartridge clips and reels and motor lamps.

THERMIT, LTD., 27, MARTIN'S LANE, CANNON STREET, E. C.
This exhibit consisted of the well-known pure metals and alloys, free from carbon, trade mark "Thermit," made by Dr. H. Goldschmidt's patent alumino-thermic process.

VICKERS, LTD., VICKERS HOUSE, BROADWAY, WESTMINSTER, S. W.
Duralumin. The aluminum alloy, which is claimed to be "as strong as steel and as light as aluminum." This alloy has been described several times in THE METAL INDUSTRY.

HENRY WIGGIN & COMPANY, LTD., 55, GEORGE STREET, BIRMINGHAM.
This exhibit consisted of the metals, nickel and cobalt, and their alloys.

WILLIAMS, HARVEY & COMPANY, LTD., MELLANEAR WORKS, BOOTLE, LIVERPOOL.
Ingots of various classes of tin, grain bars and granulated tin, and samples of solder showing what this class of alloy is when made up with their tin.

THE YORKSHIRE COPPER WORKS, LTD., LEEDS.
Copper and brass tubes.

YORKSHIRE ENGINEERING SUPPLIES, LTD., INGHAM STREET, HUNSLET ROAD, LEEDS.
Copper alloy and particularly phosphor bronze, also white metal alloys in castings fractured to show the absolute homogeneity given by the effective checking of segregation in the patent "Eatonia" process of casting non-ferrous metals.

CARL ZEISS (LONDON), LTD., 13-14, GREAT CASTLE STREET, W.
Micro and photo-micrographic outfits.

LUBRICANTS FOR PRESS TOOLS

By PETER W. BLAIR.*

What are the best lubricants to use on copper, brass, steel and all classes of sheet metal goods is a question often asked. Or is it practical to dispense with a lubricant? Although there are some shops in which no lubricant is used when working sheet metals, and good results are obtained, yet it has been the experience of the writer that it is best to use a lubricant. For all cutting dies on brass and steel a heavy animal oil is best. Pure lard is very satisfactory, although very expensive. When punching copper or German silver a thin coating of lard oil or sperm oil should be spread over the sheets or strips before punching. A good way to do this evenly is to coat one sheet thickly and then feed it through a pair of rolls, after which a number of other sheets may be run through the rolls and thus coated evenly. For drawn work this method of coating the sheets from which the shells are to be drawn will be found to be the best, as the coating of oil on the stock will be very thin and it will not be found necessary to clean the shells afterward, the oil having disappeared during the blanking and drawing process. When oil is applied with a pad or brush the coating will be so thick that it will be necessary to clean the article produced.

In drawing steel shells a mixture of equal parts of oil and black lead is very useful, and while it may be used warm, it does not affect the work as much as the speed of the drawing press does; the thicker the stock the slower must be the speed of the punch. A heavy grease with a small proportion of white lead mixed in with it is also recommended for this purpose. If the drawing die is very smooth and hard at the corner of the draw, or edge of the die, the liability of clogging will be reduced to a minimum. Often it will help to give to the die a lateral polish by taking a strip of emery cloth and changing the grain of the polish from circular to the same direction as the drawing.

For drawing brass or copper a clean soap water is considered most satisfactory. One of the largest brass firms in the country uses a preparation made by putting 15 pounds of Fuller's soap in a barrel of hot water and boiling until all the lumps are dissolved. This is used as hot as possible. If the work is allowed to lie in the water until a slime has formed on the shell it will draw all the better. A soap that is strong in resin or potash will not give good results. In drawing zinc the water should be hot, or the percentage of broken shells will be large. Aluminum is an easy metal to draw, but it hardens up very quickly. For lubricants, hard oil, melted Russian tallow and vaseline are all good. The lubricant should be applied to both sides of the metal.

ACID-PROOF ALUMINUM ALLOY.

There are many cases where it would be desirable to have an aluminum alloy which would be acid-proof—as for instance for the manufacture of tubing, cocks and valves, cables, pumps, etc. It will not do to electroplate them or cover them mechanically; they should consist entirely of an alloy which can be cast, rolled, soldered, etc. An alloy which is said to be proof against the action of such acids as the above-named articles are likely to be called upon to withstand, is composed of 92 parts by weight of aluminum, 2 of bismuth, 5 of copper, and 1 of silicum. In making it, the three last-named elements are melted together in one crucible and the aluminum in another; when the contents of both crucibles are fluid, they are well mixed together. ROBERT GRIMSHAW.

*Foreman, Brass Finishing Department, H. Mueller Manufacturing Company, Decatur, Ill.

TAP AND DIE REVOLVING ATTACHMENT FOR HAND OPERATED SCREW MACHINES

By Ernest Dietz.

To anyone familiar with the operation of turret lathes, particularly, on brass work, it must be apparent that on pieces requiring threading operations a large percentage of the time is taken up by the stopping, reversing and restarting of the machine in order to withdraw the tap or die from the work. In addition to these time losses there is to be taken in consideration the expenditure of power necessary to stop and reverse machines running at high speeds, the wear and tear on countershafts and belts, also the necessity of an extra pulley on the line and countershaft which could be utilized to give a wider range of forward spindle speeds. The self-opening dies have to a great extent solved this problem as far as external threading operations are concerned. For internal threading or tapping there are collapsible taps made on the same lines as the self-opening dies. These taps, however, are not practical in the smaller sizes, say below 1 inch diameter, leaving a large percentage of work dependent upon the solid tap for internal threading.

There has been in use for some time on automatic screw machines, a device for revolving tap or dieholders in the same direction as the workspindle but at a different speed. It is used when the work requires no slow speeds except for threading and enables the spindle to be run at its maximum speed for economical production while the tap or die is revolved at suitable speed to insure the best results. The tap or die may be withdrawn from the work by revolving it in the same direction as the spindle, but at higher speed. There are no time and power losses, as the machine need not be reversed and other operations may be performed upon the piece during the tapping operation, while the work is running at its highest economical speed.

Of course, in the case of the automatic machines referred to this attachment is considered in the design of the machines and provisions are made to revolve the tap and die holder by means of bevel gears located in the center of the turret., On most hand operated machines, however, this method of driving the tap holder would be impractical, owing to details in the turret construction, and other means must be devised to transmit power to the tap holder if this attachment is to be used.

In the accompanying sketches several views of a revolving tap holder designed for use on hand screw machines are shown. This tap holder is arranged for two speeds, the low speed, which is one-half the spindle speed for tapping, and the high speed, which is double the spindle speed for backing out the tap. The speeds are changed automatically by a clutch shown at *n*, which may be operated either by a camstrip fastened to the bed of the machine or a set of stops located on the spline shaft *i*. Provision is made through an automatic clutch to transmit the driving power through the spline shaft only when the turret hole carrying the attachment is in line with the spindle. Considering the details we have in Fig. 1, the elevation and in Fig. 2, the plan view of the attachment, the dotted outline in Fig. 2 showing the position of the principal parts after the turret has been indexed around one hole. At *a*, Fig. 1, is shown a casting forming the bearings for the vertical shaft, *d*. This casting is fitted and bolted to the headstock of the machine. Its lower part forms a guard or cover for the miter gears *b* and *c*. The gear *b* may be fastened to the chuck hood or the spindle of the machine, the method depending upon the design and the make of the machine for which the attachment is to be made.

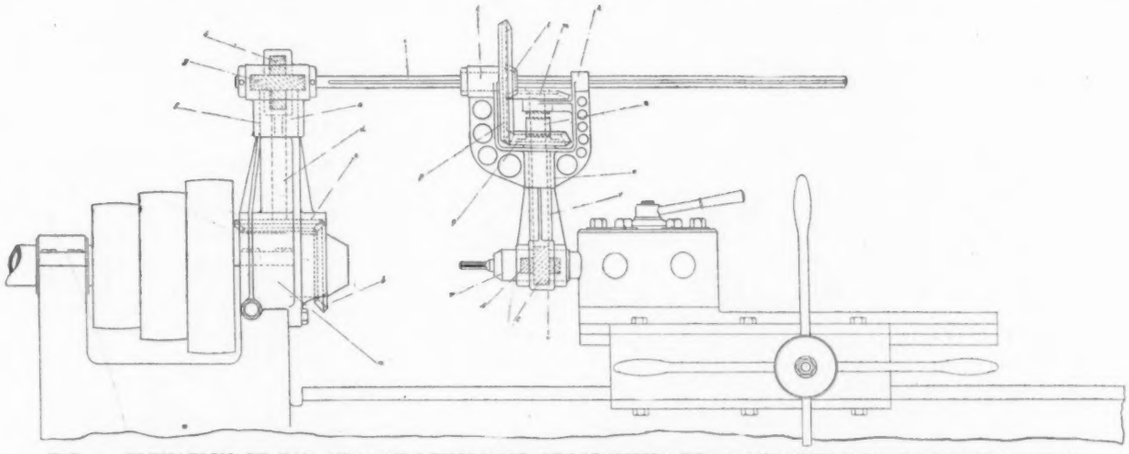


FIG. 1. ELEVATION OF TAP AND DIE REVOLVING ATTACHMENT FOR HAND-OPERATED SCREW MACHINES.

The miter gear, *c*, is keyed to the lower end of the vertical shaft, *d*. The upper end of this casting is turned and finished at *f*, to form a bearing for the housing, *e*. This housing encloses the spiral gears, *g* and *h*. The spiral gear, *g*, is keyed to the vertical shaft, *d*, while the gear, *h*, is connected to the spline shaft, *i*, through a clutch which is automatically thrown in when the tap approaches the work and automatically disengages when the tap is backed out. The details of this clutch are not shown in the sketch. It is clear that the swivel joint as shown at *e* and *f* allows the spline shaft, *i*, to assume any angle in relation to the spindle and the tapping attachment caused by the revolving of the current. It should be noted here that the attachment is connected to the spindle throughout the entire cycle of operations, although the tap revolves only when actually doing its work.

The spline shaft, *i*, is supported at its outer end by the bracket, *k*. This bracket forms at its larger arm the bearing for the bevel gears, *l* and *p*. These gears are free to slide on the shaft but are connected to it for

driving purposes by a key secured in the hub of the bevel gears. The same bracket, *k*, is bored at its lower end to fit and turn upon a bearing formed by the upper end of the tap holder housing, *u*. This bearing is shown at *o*. A hollow vertical shaft having its bearing in this housing, *u*, and the bracket, *k*, carries upon its upper end the bevel gears, *q* and *m*, also the sliding member of the jaw clutch, *n*. The bevel gear, *m*, meshes with the pinion, *l*, on the spline shaft. Their ratio is two revolutions of the spline shaft to one revolution of the gear, *m*. The bevel gear, *q*, meshes with the gear, *p*, on the spline shaft and their ratio is one revolution of the spline shaft to two of the gear, *q*. On the hubs of the gears, *m* and *q*, are formed teeth to correspond with similar teeth cut on the ends of the sliding jaw clutch, *n*. This clutch is keyed to the vertical hollow shaft, *v*. It is free to slide upon it vertically. It may be operated by means of a rod running through the vertical hollow shaft and a cam strip fastened to the bed of the machine, or by a lever connected to the bracket, *k*, and operated by stops placed at proper intervals on the spline shaft, *i*. (The cam strip and the stops are not shown in the sketch.)

To the lower end of the hollow vertical shaft is keyed the spiral gear, *s*. This gear meshes with a similar gear, *t*, cut upon the outer circumference of the revolving part, *r*, of the tap holder. This revolving part runs in bearings formed in the body, *u*, of the tap holder, and serves at the same time as a housing for the spiral gears, *s* and *t*. The hole in the revolving part of the tap holder should be large enough to allow for bushings if stock taps with shanks of various diameters are to be used.

In general it should be noted that the parts carried by the turret should be constructed out of such materials and in such a manner so as to have a minimum of weight at this point. It may appear at first glance that an attachment of this description could not be justified on a hand-operated screw machine on account of its cost. But if we consider the amount of time and power saved by the elimination of the reversing of machines running at high speeds, the lowered cost of upkeep of belts and countershafts due to the decrease in wear and tear, also the added convenience of having an additional pulley on the countershaft giving a wider range for the forward speeds, it must be admitted that the investment is not only justified but likely to bring large returns.

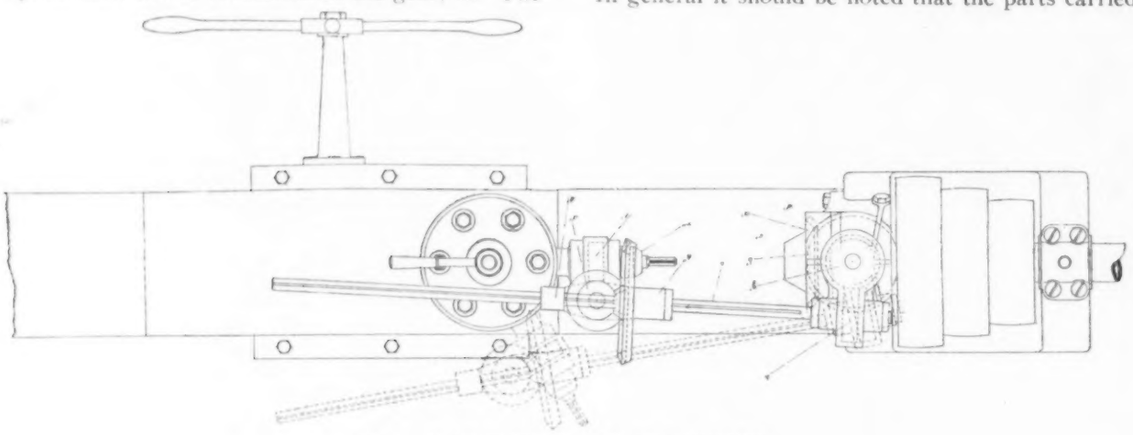


FIG. 2. PLAN VIEW OF THE ATTACHMENT.
The dotted lines show the position of the principal parts after the turret has been indexed around one hole.

THE GRECIAN OR ROMAN GOLD FINISH

By Charles H. Proctor.

As the writer has recently been the recipient of quite a number of inquiries regarding the "Grecian and Roman gold finishes," it would seem that there are some platers who are under the impression that these names represent different finishes, whereas they are identically the same. The method of production is as follows:

For plated or gold articles the surface is produced by the satin finish scratch brush or sand blasted very lightly, using for the abrasive finely ground glass, and afterwards gilding in a fine yellow gold solution, using anodes of 22 karat gold:

Water	1	gal.
Phosphate of soda	6	ozs.
Bisulphite of soda	1	oz.
Cyanide of potassium	6	dwts.
Neutral chloride of gold	7½	dwts.

To produce similar results by lacquering upon a brass surface, the articles would have to be satin finished in a matt dip. This dip consists of equal parts of aqua fortis (38 degs.), oil of vitriol (66 degs.) and metallic zinc. The zinc is first dissolved in the aqua fortis in the proportion of two pounds of sheet zinc to each gallon. When the acid becomes cool the sulphuric acid is added in small proportions until all has been added. Articles should now be tried out. Keep the zinc well stirred in the acid and immerse the cleansed articles. In a few minutes they become satin finished, but with a dirty red appearance. They should then be removed, washed in water and run through the regular bright dip, consisting of:

Oil of vitriol	1	gal.
Aqua fortis	1	gal.
Muriatic acid	2	ozs.
Water	1	qt.

Then wash and dry out. If the surface is satisfactory the articles are lacquered with a transparent dip lacquer, and when thoroughly dry are given the yellow gold color by the aid of a gold dye. They are then washed in clean, cold water and dried. This is the method used by many buckle concerns who produce the Grecian or Roman gold finish without the use of gold. It will stand the usual test. If the matt dip does not work satisfactorily, add a very little water. If the satin matt is too fine, add more aqua fortis; if too coarse, add more oil of vitriol. Carbonate or sulphate of zinc can be used if desired, but by dissolving the sheet zinc direct it is the cheapest. Gold dyes and lacquers for the purpose can be purchased from lacquer manufacturers advertising in The Metal Industry.

THE MANUFACTURE OF HIGH CLASS SPELTER FROM GALVANIZERS' WASTE

A Description of the Shortman-Delaville Process.

By Ernest A. Lewis.*

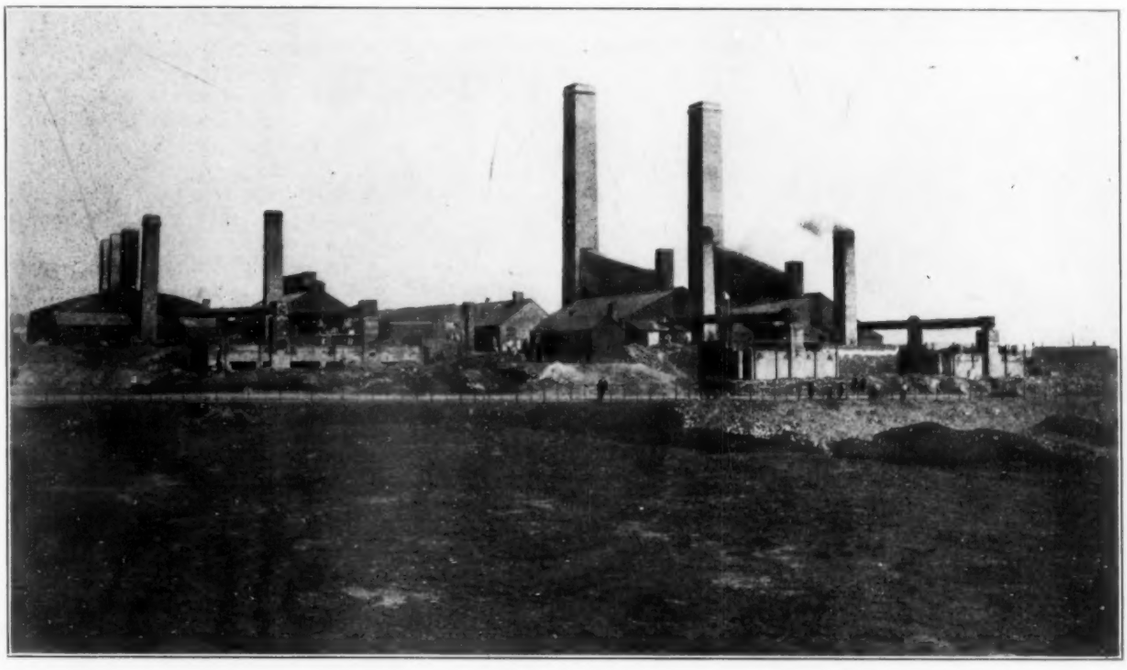
About two miles out of Walsall stands the mining village of Bloxwich, on the outskirts of the Cannock Chase coal field. No one ever goes to Bloxwich as a health resort, although a few miles on is some of the prettiest scenery of the Midlands. The chief industries of the village, besides the collieries, in the vicinity, are an iron works and the works of the New Delaville Spelter Company, Ltd. The latter are now established as one of the most successful spelter companies in Great Britain. E. H. Shortman, whose ingenuity and perseverance has brought the works to their present high state of efficiency, has been all his life in the spelter making business. He was born fifty-eight years ago in Swansea, where his father was for fifty years in the employment of Vivian & Sons' Spelter Works. Mr. Shortman served his apprenticeship with this firm. At the age of twenty-six he became manager of the spelter works of John Lysaght, Ltd., of Bristol. He erected their spelter works, and when he left their employment, after being with them sixteen years, he left twelve spelter furnaces in full working.

E. H. SHORTMAN.

He then turned his attention to the manufacture of high-grade spelter, for which there is now a big demand among brass mills, especially for making cartridge cases. After some years' experimenting, he found a filter could be inserted at the mouth of the retort, which mechanically filtered out the lead and left the pure spelter to pass into the condenser. Mr. Shortman had a similar experience to that of so many other inventors, and found that to make the process a commercial success, much work would have to be done.

The board of directors of the New Delaville Spelter Company, Ltd., invited Mr. Shortman about ten years ago to manage their Bloxwich works. He continued his experiments on the large scale, and after much hard work his efforts were crowned with success, and letters patent were granted him jointly with the New Delaville Spelter Company, Ltd. The process is now patented in every country.

In the galvanizing industry many hundreds of tons of zinc residues in the shape of ashes and hard spelter are made yearly, the latter being, as is well known, an alloy of iron and spelter averaging about 94 per cent. zinc. The bulk of the zinc is sweated out of the hard spelter in special furnaces, leaving a residue of what is known in the trade as "granular." The granular contains about 73 per cent. zinc. It is from "granular" and zinc ashes that the New Delaville Spelter Company, Ltd., extract their high-grade spelters by the Shortman process.

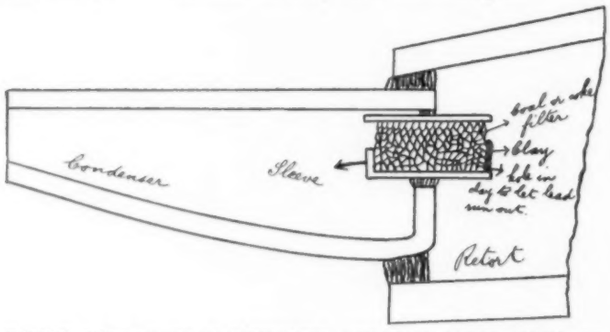


THE BLOXWICH WORKS OF THE NEW DELAVILLE SPELTER COMPANY, LTD.

Nearly all galvanizers prefer to use a good quality of spelter nowadays in their baths, and it follows that even under ordinary methods of smelting, zinc obtained from ashes is of better quality than that manufactured from ore. The myth of spelter made from all ore being of necessity the best is fast dying out, but now and again some old-fashioned manufacturer is met with who assures you that spelter distilled from ore alone is really virgin.

*Metallurgist, Birmingham, England.

The Shortman process is very simple and inexpensive. The furnaces are of the ordinary gas-fired regenerative Belgian type, but between the retort and the condenser is placed a small fireclay sleeve, as shown in the diagram, filled with small pieces of anthracite or coke. This acts as a mechanical filter, preventing the passing of lead, so only the pure zinc finds its way into the condenser. It is



ROUGH SKETCH OF SHORTMAN'S APPARATUS FOR EXTRACTING ZINC. PATENTED IN ALL COUNTRIES.

possible, when using this arrangement, to obtain two tappings of high-grade spelter before the filtering medium becomes foul. After the second tapping the sleeve is pushed into the retort and the remaining tappings are of ordinary quality spelter. The bulk of the lead is condensed in the filters and collected when the retorts are cleared for another charge. The charge is mixed with fine breeze dust in the same manner as in ordinary smelting.

The Bloxwich works have now four large furnaces in full working, and contemplate the erection of another one immediately, and still another in the near future, as there is such a great demand for high-grade spelter in the cartridge, brass sheet and tube trades. The New Delaville Spelter Company, Ltd., have a considerable regular weekly output of spelter guaranteed to contain 99.9 per cent. zinc as a minimum; it is more often nearer 99.95 per cent. They also make spelter of the following guaranteed purities: 99.9 per cent., 99.5. per cent, 99.4 per cent., 99.35 per cent., and 99 per cent.

The works are situated on the canal side, and have a railway siding running into them. They have large stores for zinc ashes, convenient to the furnaces; also large rooms where they make and carefully dry the fireclay pots, condensers and sleeves used in the process. There is also a chemical laboratory where the zinc ashes, after being sampled, are assayed; in addition, each tapping of spelter is analyzed, so that there is no chance of any dispute as to the quality of the spelter after it leaves the works.

Mr. Shortman is assisted in the management of the works by his two sons, Edward Shortman, Jr., being the works manager, and Harry Shortman the assayer.

ALUMINUM AND ZINC ALLOYS

TENTH REPORT OF THE ALLOYS RESEARCH COMMITTEE.

(Concluded from July.)

STUDY OF THE WROUGHT ALLOYS.

Billets of the alloys containing up to and including 26 per cent. of zinc were cast at the Laboratory and were rolled and drawn to various sizes, including wire and sheet, at the Milton Works of the British Aluminum Company. Hot-rolling was found possible with all these alloys, but not with an alloy containing 30 per cent. of zinc.

Tensile tests on a representative series of alloys lying between the limits of composition just named were made on material in the form of (1) bars hot-rolled to 1¼-in. diameter, (2) bars hot-rolled to ⅞-in. diameter, (3) bars hot-rolled to ½-in. diameter, (4) bars cold-drawn to 13/16-in. diameter, (5) bars drawn with annealing to 13/16-in. diameter, (6) cold-drawn wire 0.1285-in. diameter, and (7) sheet of 0.14 and 0.07-in. thickness. In addition, the material in the form of ⅞-in. bars hot-rolled, 13/16-in. cold drawn, hot-rolled ½-in., and wire, as well as sheet of both thicknesses, was also tested after annealing for one hour at 400 degs. C. (752 degs. F.). The tensile tests on all the hot-worked material gave very uniform and consistent results which can generally be represented by reasonably smooth curves when the data are plotted against zinc-content. The yield-points in these tests, as contrasted with those on castings, are well-defined and as regular as the results for ultimate stress.

In the form of 1¼-in. hot-rolled bars, the alloy No. 26 attains a tensile strength of 27 tons per square inch, with a yield-point of 25 tons per square inch and an elongation of 16.5 per cent. on 2 ins. Both the tensile tests on 1¼ and on ⅞-in. hot-rolled bars gives curves of ultimate stress plotted against zinc-content which are very similar to one another, but it is a striking feature of these alloys that the curve for the smaller section lies above that for the larger only up to a zinc-content of about 12 per cent.; above that concentration the 1¼-in. bars give higher ultimate stresses than the ⅞-in bars. The results of tests on still smaller sizes of material, even including the hard-drawn wire, show corresponding results, although the crossing-point of the respective curves differs from one size of material to another. The general conclusion is demonstrated that the beneficial effect of "work" on these alloys diminishes steadily with increasing zinc-content, until the 25 and 26 per cent. alloys are reached in which we find that the highest ultimate stress is always given by the 1¼-in. hot-rolled bars. These alloys, richer in zinc, therefore, present the unusual property that cold-drawing a bar from 1¼-in. to 13/16-in. diameter, although it raises both yield-point and elastic limit and lowers elongation and reduction of area, actually *reduces* the ultimate stress.

The condition (excluding wire) of highest tensile strength, together with the yield-stress and elongation corresponding to that condition, are given for a series of typical alloys in the following summary table:

No. of the Alloy (also per cent. Zn).	Condition for Highest Ultimate Stress.	Ultimate Stress. Tons per sq. in.	Yield-Point. Tons per sq. in.	Elongation on 2 ins. Per cent.
5	⅞-inch hot-rolled bar	8.94	7.4	26
9	½-inch hot-rolled bar	11.17	6.98	38*
11	½-inch hot-rolled bar	13.78	9.42	35*
13	13/16-inch cold-drawn bar	14.73	12.80	19.5
17	1¼-inch hot rolled bar	19.85	13.20	22
20	1¼-inch hot-rolled bar	22.64	17.3	20.5
26	1¼-inch hot-rolled bar	27.09	25.00	16.5

*On 1 inch.

The tensile tests on annealed material were undertaken principally to ascertain whether the peculiar effects of "work" mentioned above persisted after annealing, and the results are discussed with reference to the resulting microstructures. It was found that the "hot-rolled" materials exhibited a considerable amount of deformation in their constituent crystals and that this deformation was entirely removed by annealing, although the scale of the resulting structure differed widely according to the treatment which each specimen had received. In general terms it was found that the tensile strength of the annealed materials was not strictly proportional to crystal size, but that the more severely worked material always exhibited better results after annealing than less severely treated metal. The highest ultimate stress in annealed material of the present series of alloys was obtained from alloy No. 20 in the form of annealed cold-drawn wire, the value being 21.1 tons per square inch, but it must be noted that the higher alloys of the series (Nos. 25 and 26) were not included in all the tests on annealed material.

The tests on wire and sheet gave results which have already been referred to in connection with the effect of work and of annealing. Sheets were rolled from alloys Nos. 15 and 20; the former rolled well, but the latter cracked somewhat at the edges. The tensile tests show considerable variations as regards yield-points between longitudinal and transverse tests, although these are obliterated to a considerable extent after annealing. The yield-stresses, however, gave very erratic results, and this is probably to be ascribed to slight surface cracking of the metal. In the cold-rolled condition, alloy No. 20, in the form of sheet 0.07 inch thick, gives an ultimate stress of 23 tons per square inch, but there is little or no elongation in this condition. After annealing the ultimate stress falls to 18 tons per square inch, but the elongation reaches 10 per cent. on a longitudinal and 6.25 per cent. on a transverse test.

As regards the tests on the alloys in the form of wire, it was found possible to obtain even alloys Nos. 25 and 26 in this form, but the results given by these were disappointing, since they were lower than the tests obtained with 1¼-in. hot-rolled bars. In the annealed condition, however, these wires give results which appear to be promising; thus No. 19 gives an ultimate stress of 21 tons per square inch with 17.7 per cent. of elongation. It is interesting to note that the tests on annealed wire exhibit a well-defined maximum in tensile strength at or near a concentration of 20 per cent. of zinc.

Tensile tests at high temperatures were made on a series of the alloys in order to ascertain the effect of zinc-content on the rate of loss of strength of these alloys with increasing temperature. Most of the alloys were tested up to 200 degs. C. (392 degs. F.), but in two cases considerably higher temperatures were employed (up to 595 degs. C.). In every case it is found that there is a rapid fall in the yield-stress and ultimate stress with rising temperature, even 50 degs. C. producing a marked effect. The rate of loss of strength varies according to the composition of the alloy; thus at 100 degs. C. the alloys containing up to 13 per cent. of zinc have lost about 36 per cent. of their tensile strength at the ordinary temperature: the alloys containing from 15 to 17 per cent. show a loss of 44 to 52 per cent., but this figure again diminishes to 26 per cent. for alloy No. 26. These relative rates of loss are confirmed at higher temperatures. At still higher temperatures the strength of the alloys becomes exceedingly small, but they exhibit a remarkable degree of ductility as measured by elongation and reduction of area; the latter in some cases is so great that the fracture is drawn down to a sharp point, while the elongation in one instance reached 133 per cent. Forging tests, however, show that this extreme ductility exists only under "static" loads, and that the alloys which draw out to fine points in the testing machine are broken into small fragments if struck sharply with a hammer at the same temperature.

The elastic properties of the alloys have been determined both for the hot-rolled and cold-drawn materials. They exhibit a satisfactory elastic behavior and show well-defined elastic limits, which increase regularly with the zinc-content and consistently with the ordinary yield-point determinations. The elastic moduli of all the alloys are almost identical, lying near the value 9×10^6, a low value which may prove a disadvantage for certain possible uses of the alloys.

Autographic stress-strain diagrams have been taken from 8-in. specimens; the diagrams show well-defined yield-points and they also exhibit the stepped appearance which is typical of the mode of plastic extension of many non-ferrous materials. The comparison of the results of these tests on 8-in. test-pieces with those made on the standard 2-in. specimens shows that the two series of tests are in good agreement. Apart from a somewhat low result given by the 8-in. test-piece of alloy No. 5, the differences between the extensions are not abnormal. The ultimate stresses agree remarkably well, the values given by the 8-in. specimens being in two cases slightly higher. There is rather more divergence in the case of the yield-points, the 8-in. specimens again giving higher results.

Torsion tests have been carried out on specimens cut from the alloys in the form of 1¼-in. hot-rolled bars; comparison of the results with those of tensile tests shows that the torsional strength, although it increases considerably with increase of zinc-content, yet does not increase as rapidly as the tensile strength. The ratio of the maximum stresses under the two forms of test falls from 1.10 for alloy No. 9 to 0.76 for alloy No. 25.

The hardness numbers of the alloys, again in the form of 1¼-in. hot-rolled bar, have been determined by the Brinell method under loads of 1,000 and 3,000 kg. respectively, and by the Shore scleroscope. The proportionality between the hardness numbers and tensile strength is found in these alloys to be only of a general kind, the shapes of the respective curves being notably different.

Compression tests have also been made on the wrought alloys. The results are in strict conformity with those of tensile tests, although the compression yield-stresses are always slightly higher than those found in tension.

Dynamic tests have been carried out on the alloys both with the machines designed for that purpose at the National Physical Laboratory under the direction of Dr. T. E. Stanton, and also by the kindness of Professor J. O. Arnold at the University of Sheffield. The tests made at Teddington include direct alternations of stress, repeated-bending impact and single-blow impact.

The tests in alternations of direct stress give a series of results for the safe range of alternating stresses for the alloys, and this curve lies considerably below that of the static elastic limits. These ranges, although low when compared with the ordinary tensile test results, yet indicate a very decided advance on other light alloys which have been described in the ninth report. The best of those alloys (of aluminum with copper and manganese) showed a safe range of 9.4 tons per square inch, while the best of the present series has a range of 12.0 tons per square inch.

Alternate-bending impact tests were made with a weight of tup of 4.71 lbs. and heights of fall of 1.0 in. and 0.71 in., respectively. Both sets of tests give curves

of very similar shape, which show that after 15 per cent. of zinc the resistance to this test is strictly proportional to the zinc-content of the alloy. Of the present alloys, No. 9 shows a resistance practically equal to that found in the best of the light alloys described in the ninth report (about 600 blows with a fall of 0.71 in.), while the best alloy of the present series (No. 25) required 3,400 blows for fracture. This power of resisting repeated impact is particularly noteworthy in view of the fact that the aluminum-zinc alloys are frequently spoken of as being weak under shock.

Single-blow impact tests, made on the Izod machine, show that the work absorbed by fracture reaches a maximum for a zinc-content lying between 15 and 20 per cent. This is in accordance with the fact that such tests are affected by both tensile strength and ductility, so that the increased tensile strength of the alloys containing more than 20 per cent. of zinc is more than outweighed by their lower ductility so far as this test is concerned. As compared with the light alloys previously studied, the present series are decidedly superior, although the difference is not so marked as under some of the other tests.

Under Professor Arnold's alternate-bending test, the alloys give remarkably uniform results, but the curve of number of alternations endured falls rapidly with increase of zinc. Professor Arnold remarks that the resistance of these alloys to his test varies from ⅛ to ¼ that of heat-treated best mild structural steel. It is interesting to note, in comparing the results of the three last-mentioned forms of dynamic test, that the curves representing their results are closely related to the curves of ultimate stress and elongation or reduction of area as shown by tensile tests. Thus the repeated-bending impact tests give a curve which is closely proportional to that of ultimate stresses, while the results of Professor Arnold's tests are proportionate to the ductilities of the alloys as shown by elongation or reduction of area. The single-blow impact tests, on the other hand, appear to be proportional to the sum of these two properties.

In view of the results of all the mechanical tests the authors arrive at the conclusion that an alloy containing about 20 per cent. of zinc probably represents the best combination of properties obtainable in the simple binary aluminum-zinc series.

Corrosion tests on specimens of these alloys exposed to the sea have been carried out for a period of over 500 days, and the results show that the rate of loss of weight under such exposure increases with increasing zinc-content. The actual rate of loss, however, is not as great as might have been anticipated, varying, when allowance for the difference of density is made, from 1½ times that of Naval Brass to 1½ times that of Muntz Metal. The authors, however, regard their corrosion tests as purely preliminary, since the alloys were used in the cast state, while subsequent study suggests that annealed material would show considerably less corrosion. The method of measuring corrosion by loss of weight is also regarded as inadequate for the study of these alloys, and further corrosion tests are being undertaken.

A general feature of some importance in connection with all the alloys described in the present report, and particularly with those containing from 10 to 30 per cent. of zinc, is the great facility with which they can be worked by machine tools of all descriptions, in most cases without the use of any lubricant. Turnings of exceptional length and strength have been obtained from several of these alloys. The machined surfaces retain their brightness in the air of the laboratory for many months without protection of any kind.

Attention is directed to the appendix, in which the authors give a preliminary account of the properties of a ternary alloy of aluminum with zinc and copper (alloy No. 25/3) containing approximately 25 per cent. of zinc and 3 per cent. of copper. This alloy, which can be rolled hot, although some special care is required in dealing with it, gives remarkable results under mechanical tests. An ultimate stress of 34 tons per square inch has been attained with this material, while its resistance to repeated-bending impact is over 4,500 blows, as compared with 3,400 of the best of the binary alloys. Tabulated results of tests made on this alloy are given, but a fuller discussion of its properties is postponed until a systematic study of these ternary alloys has been completed.

The End.

A REMARKABLE PIECE OF HAND CRAFT.

A TWENTIETH CENTURY CHALICE.

The chalice shown in the above picture is a remarkable example of handicraft of the present day. The cup was made entirely by hand and was made to order. Its various features are based partly on church symbolism and partly on sentiment. The chalice is the work of Theodore T. Goerck, who has been associated with gold and silver work for many years. Mr. Goerck is responsible for the finished cup in the constructive sense as well as in the ornamental conception. The bowl takes the form of the old Celtic cups and the border is also Celtic in its origin. The lower part of the cup is Gothic. The front base panel has a carved and enameled crucifix while the panel in the back directly opposite bears in repoussé a reproduction of Raphael's St. Margaret. The cup is of silver and weighs thirty ounces. Mr. Goerck has devoted a number of years to the advancement of hand work in his own and other crafts. He feels safe in saying that hand crafts have come back to stay and will eventually reach the level of the higher arts and will then hold their own for all time.

THE LATEST PROGRESS IN OPTICAL PYROMETRY

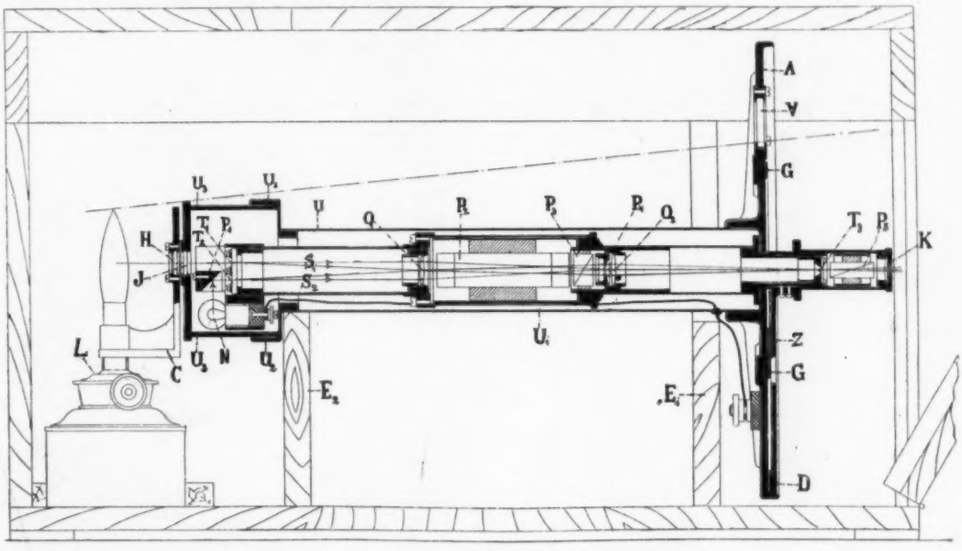
By Hermann Holz.*

The optical pyrometer has never had a keen rival in the thermo-electric pyrometer in the correct measurement of high temperatures, as, so far, no material is known that, if used as an armor, can permanently withstand prolonged and direct exposure to intense heat. A further aggravation of such difficulties is to be found in the chemical activities of furnace products and gases, which in many cases make an adequate protection of the thermo couple entirely impossible. In other numerous instances in practice the temperature measurements cannot be made with pyrometers which must be brought into contact with the material operated upon, on account of its inaccessibility through being in motion. In all such cases, and where the temperature of large areas of hot masses must be readily measured, pyrometers acting at a distance are required, and if it comes to the measurement of exceedingly high temperatures, above 1500 deg. C., only such instruments can be employed.

The most important point in favor of all optical pyrometers based on the well-known formula of Paschen and Wien is the fact that their indications are not based on "ascertained properties" of certain materials, such as the thermo-electric forces of the thermo-couple used with radiation pyrometers, but on a well-known infallible law of physics. As to the practical application of optical and radiation pyrometers, the former advantage of the radiation over the optical instrument through direct temperature readings on the Centigrade scale, in contrast with the readings from separate tables with the old Wanner type, has entirely disappeared with the recent improvement of the optical pyrometers through construction with direct reading temperature scales.

The application of the Paschen and Wien formula in a commercial instrument has until now been confined to one instrument manufactured in Germany, and most detailed researches have been carried on for the last few years with the view of improving and perfecting same. The many careful tests made in the laboratories of the Reichsanstalt, as well as before the furnaces of the most prominent German glassworks, were highly successful and resulted in the introduction of a perfect type on the American market, known as the Scimatco and shown in the illustrations. Some of the important improvements of the Scimatco pyrometers, which have a range of from 650 deg. to 7,000 deg. C., may be mentioned here.

While the direct temperature scales of similar instruments are fixed to the metal case and therefore have to be separated from the instruments whenever the lamp must be renewed, the direct temperature scale of the Scimatco pyrometer is permanently fixed to the ocular. As the scales of the other types can only be readjusted to the ocular with difficulty, its construction is apt to cause errors in the temperature readings. The improved construction of the Scimatco, however, permits a most perfect adjustment of the direct temperature scale. The direct temperature scale of the Scimatco is further much preferable to that of the other optical pyrometers, as the Scimatco scale shows not only the temperature, but also the angle, on which the reading is based, permitting a reliable checking of same. The temperature readings with the Scimatco are, therefore, at all times absolutely reliable. The detachable screw-cap of the steel tube protecting the Scimatco pyrometer is also an important advantage over other instruments similarly protected. The small electric lamp has to be renewed frequently, and the construction of other pyrometers necessitates the detaching of a number of fine screws, and also the removing of the entire apparatus from the metal case. On the other hand, the renewing of the electric lamp in the Scimatco can easily be done in a few seconds, without tools. The electric lamp of the Scimatco pyrometer is enclosed in the protective steel tube, while the lamp in other optical pyrometers is unprotected. The large disk of the Scimatco pyrometer fully protects both eyes. In taking heat measurements with the new type of other optical pyrometers before a furnace, the left eye remains unprotected and must be closed. Experts have declared that it is impossible to make reliable readings with



CROSS SECTION OF THE SCIMATCO OPTICAL PYROMETER.

*Scientific Materials Company, Pittsburgh, Pa.

only one eye open. The temperature scale of the Scimatco is uniformly graduated in even numbers of degrees, thus facilitating readings and avoiding errors apt to occur with scales showing odd figures at irregular intervals.

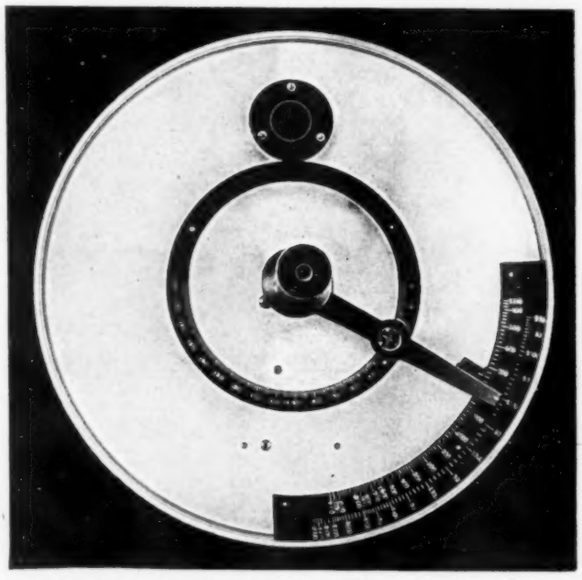
The optical parts in the Scimatco pyrometer are inserted in the protective steel tube in such a way that they have no contact with the metal wall of the tube. If the instrument is used before large furnaces, the pyrometers naturally become extremely hot. It is then of the utmost importance that the lenses and prisms, which are partly cemented together, be fully protected against heat and sudden changes of temperature. In the construction of the Scimatco pyrometer, the necessary protection is not only rendered against the radiating heat by the surrounding steel tube, but even the conduction of heat is prevented, as the optical parts are separated by air from the heated metal walls of the instrument.

THE SCIMATCO OPTICAL PYROMETER.

The screw-cap in absorbing the heat produced by the electric lamp and the small slit through which the light rays enter the pyrometer from the outside is constantly kept warm. If other optical pyrometers are used before a furnace, the sudden and very large increase of heat expands the metal parts, and, therefore, changes the size of the small slit through which the light enters the instrument. When a pyrometer is adjusted or standardized, it is done in a laboratory, in a far lower temperature than the pyrometer finds in its practical applications. If the metal expands, the slit gets smaller, and therefore, the intensity of the light entering the instrument—the vital point on which measurements are based—diminishes. The electric lamp in the Scimatco produces a constant temperature in the part bearing the slit and therefore successfully offsets the large changes in outside temperatures, while a considerable difference is caused in the dimension of the slit of other types through such outside influences.

The slit through which the light rays enter the Scimatco pyrometer is protected against dust and soot by a small glass slide of known optical properties, which have been most carefully investigated and fully approved by the "Reichsanstalt." This device renders the instrument immune from dust and soot particles settling in the small slit and optical interferences caused thereby. No other optical pyrometer is protected in such a way; in fact, the use of similar instruments in dusty atmospheres always gives rise to disturbances caused by dust and soot, a very disagreeable point, as it is difficult, sometimes impossible, to give the pyrometer a thorough cleaning. If the hair slit is covered by dust or soot, the instrument is absolutely useless.

Another very important improvement is the way in which the electric current is supplied to the small electric lamp of the Scimatco pyrometer. It has been fully ascertained that a great danger of fluctuations in the electric current exists, if the wires are attached to small leads to the contact of the lamp, as on other types. First of all, the small leads cannot be properly and readily cleaned, and furthermore the wires are always more or less liable to tension, thus making the contacts unsafe and unsatisfactory. The system of supplying the electric current to the electric lamp of the Scimatco pyrometer is perfected in every way. The very large leads are fixed on the rear side of the temperature scale, where they can always be readily inspected, cleaned and tightened, and from there the wires are conducted to the lamp within the steel tube,



PERFECTED DIRECT TEMPERATURE SCALE—(900 to 4,000 deg. C.).

fully protected against all disturbing influences. The Scimatco pyrometer is constructed throughout in a very solid manner. The inner parts are fixed in such a way to the instrument that the whole arrangement acts like a spring whenever the apparatus suffers a shock through dropping, etc. Breakage of the Scimatco pyrometer is, therefore, hardly possible under the most straining circumstances.

CUSTOMS DECISIONS.

Nickel Bullets.

The Board of United States General Appraisers has upheld the decision of the surveyor of the port of St. Louis in assessing "nickel bullets" with duty at 45 per cent. ad valorem as "metal articles not specially provided for." The Great Western Smelting & Refining Company claims them dutiable as "nickel alloys," as "non-enumerated manufactured articles," or as free of duty as "old brass, copper or junk." The articles are metal projectiles which have been exploded or fired from a cartridge or shell, and are so-called "spent bullets." They are composed of an alloy of copper, zinc and nickel, and are melted into ingots and disposed of in that form as an alloy metal. The record showed that the alloy runs from 15 to 20 per cent. of nickel, and is not in the form of pigs, ingots, bars or sheets, and therefore does not come within the provisions of paragraph 185, as contended by the protestant.

ELECTRICITY IN THE PLATING ROOM.*

By S. E. Huenerfauth.†

The subject of electricity in the plating room is a very important one, as it applies to the art of electro-plating. In the earlier days before the introduction of dynamos, batteries were used to supply the currents. These were very satisfactory except for the expense of maintaining same, and the limited amount of current which was available. At this point I wish to say that the current given off by the battery is the most direct or continuous current to be had. The first dynamo to be used for electro-plating was invented in the year 1842 by J. S. Woolrich. This was what is known as a "magneto-electric" machine. Mr. Wild, however, was the first to construct a dynamo which was really suitable for the purpose. He invented a large dynamo with field magnets that were separately excited from the small magneto machine. His first machine was used for many years by Messrs. Elkington. It was necessary to keep the armature in this machine cool by means of a stream of water circulating through it.

About the year 1867 Mr. Wild introduced a multipolar dynamo with a redressing commutator. Weston introduced a small machine for electro-plating which had steel cores on it with the main circuit around them with an automatic cut-off to break the current to prevent the magnetism from reversing by back current from the tanks. Gramme, in 1873, built a special form of dynamo with armature wound with strips or bar wound, having commutators at each end, with an output of 1,500 amperes at eight volts. Siemens and Halske also were early in the field with machines having bar winding. Brush also constructed machines of low resistance, giving a voltage from 3.3 to 4.1 volts. Thus, we have a brief history of plating dynamos. From about the year of 1880 there were numerous types and makes of dynamos in use. We will now take up the different types of dynamos.

First, we have the magneto dynamo, which was constructed with the regular armature, but the field magnets or the poles were permanent magnets, having no coils on the poles. The objectionable features of this dynamo were that the voltage was not regular, there being quite a drop in the same from no load to full load of the dynamo.

Second, we have the shunt wound dynamo—self-exciting. This type of dynamo was in use for a great many years, and there are some in use to this day; in fact, there was one concern that continued to build them up to a few years ago. In fact, the shunt wound dynamo was a great improvement over the magneto, and also over the series wound dynamo. The greatest objection to a shunt wound self-exciting dynamo is that the voltage is not constant at the different loads. Thus, to do plating and have a nearly constant voltage it was necessary for the operator to change the field rheostat or shift the brush-rocker every time he changed the load in his tanks to keep a nearly constant voltage.

Third, we have the compound wound dynamo. This is a combination of the old series dynamo and the shunt wound dynamo. The compound wound dynamo has two sets of coils on the poles, one called the shunt coil, which is used to excite the dynamo, and which takes only a small fraction of the current generated by the armature. The series coils circuit with the armature, and by the aid of the compound or series coils we are enabled to hold the voltage constant regardless of the load in the tank. Thus, you will readily see that when the operator sets the voltage of the dynamo, it is then self-regulating. It is not necessary to keep shifting the rheostat at every change of load; in fact, any good compound wound dynamo should hold its voltage constant, whether you are using five amperes or a full load of the dynamo, thereby enabling the plater to do more and better work with a uniform deposit than with dynamos not containing these characteristics. It is now possible to build low voltage dynamos having all the characteristics of modern power dynamos, even with self-regulating brushes, compound-wound and all of the other features contained in power generators.

Fourth, we have the shunt wound separately excited dynamo, and in the writer's opinion this is the ideal plating dynamo, whether small or large, and especially in large dynamos. The separately excited dynamo has its fields excited from an external source, either from power or lighting circuit in the building or from a small exciter. This type of dynamo has practically the same characteristics as the compound would dynamo for the reason it will hold its voltage nearly constant from no load to full load, there being but a very small drop in voltage from no load to full load of the dynamo. It also has several other good characteristics, viz.: It is impossible to reverse polarity of the dynamo, constant voltage at any and all loads, large range in voltage, good commutation, finer graduation in adjusting the voltage, and cool operation.

Thus, you can see it is very important to have a good dynamo to do good plating. But the fault does not always lie in the dynamo for poor work and insufficient amount turned out for a day's work. At this time the writer wishes to say that he has visited a great many plating rooms and has often found that the dynamo and the conductors from dynamo to tank receive very little care. It is very often a fact that the plating room may be equipped with a good dynamo, but the results obtained in the plating are very unsatisfactory. It is very often a fact that the conductors are of insufficient size and are very poorly erected. Connections are very poor, badly corroded, and, in fact, are sometimes very loose and produce considerable heating at that point. This not only causes a waste in current, but also a loss in voltage and an insufficient amount of work which the plater is able to turn out. As an example, the writer was once told by one of the largest stove manufacturers that he did not know what the matter was with their plating room—that it was taking from forty-five minutes to an hour to turn out a batch of work, whereas they formerly did it in twenty-five minutes. I made an investigation and found the copper conductors from the dynamo to the tanks were insufficient. The joints were bad; in fact, badly corroded. The dynamo was of ample size. I doubled the size of the conductors, soldered all the connections and joints; the results were that he later said he was turning out double the amount of work that he did before. This is not only true in this case, but the same would apply to a great many plating rooms now operating under similar conditions. Too much care and pains cannot be taken in installing the dynamo and conductors in the plating room.

The writer had the pleasure recently of visiting a plating room that was ideal and up-to-date. The dynamos were direct driven by motors, the conductors were of the proper size, properly put up with porcelain insulators.

*Paper read before the Chicago Branch of the National Electro-Platers' Association.

†Superintendent and Electrical Engineer of the Bennett-O'Connell Company, Chicago, Ill.

The joints were all properly made and soldered, and, in fact, there was nothing to criticize; in fact, if the same care was exercised in erecting the dynamo and appliances connected therewith as in making up the different solutions, you would have much better results than you would have at the present. This is not given in the sense of criticism, but in the spirit that it may be of some benefit to you.

Next, we will take up rheostats and their use in connection with plating solutions. Nearly every plater of today uses a rheostat in connection with the tank that he has in the plating room. Rheostats are essential where you operate one or more solutions off of the same dynamo. It is very often necessary to reduce the voltage in a tank lower than you can or dare to do on the dynamo for the reason that it will interfere with the other tanks; therefore, it is necessary to provide each tank with a rheostat, but rheostats are often condemned for the reason that they are often ordered by the number of square feet or amperes required. To make this clear, "A" might have a tank containing 400 gallons of solution for his work and a 300 ampere rheostat might be the proper size, while "B" might have 400 gallons of solution, but different kind of work, and a 400 ampere rheostat would be suitable for his tank. The size of the rheostat depends upon the average number of square feet of work you have in the tank and the kind of solution. If you can give this information to your dealer, he can generally give you just the size rheostat required for your work. Do not condemn a rheostat if it does not cut down the voltage to the point to which you would like to have it or if the wires get hot. It is not always the fault of the rheostat, but simply because you have not the size rheostat required for your work. The drop of voltage across the rheostat depends upon the amount of current you are using.

Volt-meters.—This is an instrument that is almost impossible to dispense with. You would not think of operating a steam boiler without a steam gauge. Then, how can you expect to operate your plant without a volt-meter unless you simply guess at the voltage in your tanks and turn out your work accordingly? Every modern and up-to-date plating plant is equipped with a volt-meter, which enables the operator to not only read the voltage of his dynamo, but of each tank independently. Still, there are a number of plants operated today without a volt-meter and are operated simply by guess. Ammeters are used for measuring the current, either in a tank or for the entire output of the dynamo. While it is possible to operate a plating room without an ammeter, still, they are useful in determining the amount of current you are consuming in turning out your work.

THE PATTERN SHOP WOOD PILE

A Satisfactory Solution of the Problem.

By Charles E. Walster.

"Just look at that pile of scrap. Nothing but fuel for the furnace, sometimes twice a week." This is a remark, both very common and tiresome, oftentimes heard in the pattern shop, thus presenting one of the wastes which unscrupulously shears off the profits of the shop. That ever ascending bugbear, always in evidence on some portion of the pattern shop floor, and always bearing some source of annoyance usually upon the man in charge, is the important item of shop economics.

The writer was greatly interested in an inexpensive and

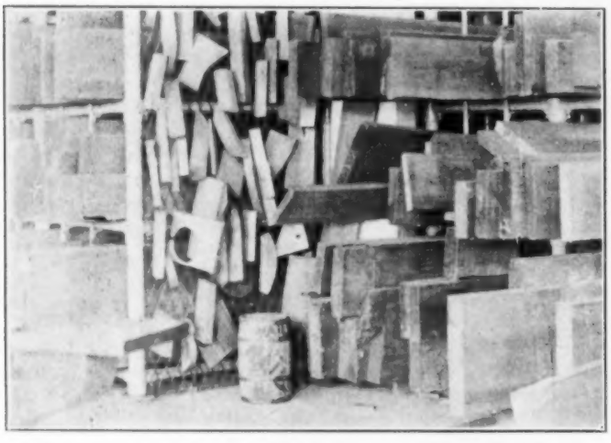


FIG. 1. STORAGE RACK FOR LUMBER AND SCRAP WOOD.

modern method of avoiding this accumulation of waste lumber, which was recently brought to his attention. To illustrate the new method of utilizing every piece of scrap lumber to some profitable advantage, photographs were taken in a lately constructed concrete building, specially designed for shop and pattern storage. Lumber and storage racks (Fig. 1) were made of wrought iron pipes with cast iron connections, using expanded metal for shelving. This expanded metal, known as "steelcrete," is nothing more than a plain sheet of steel which is expanded into meshes of a desired size and section. The operation is accomplished by an automatic machine which receives the cold sheet, and at a single stroke the slitting and opening of meshes are simultaneously accomplished.

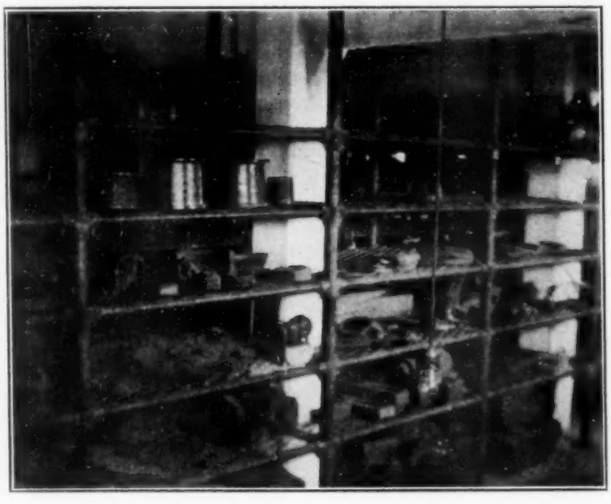


FIG. 2. IMPROVED PATTERN STORAGE RACKS.

This "steelcrete" may be fastened to the sides of the lumber rack or wall and the pieces of lumber hung thereon by simply driving a nail through the board. Thus the workman may find at a glance any particular piece that he may desire for the pattern he is about to make. This simple method is a great time saver over the old way of rummaging through a pile of scrap wood, the result of

which was generally failure to find the piece desired. Thus the pattern maker would nine times out of ten make a bee line for a plank, hence adding another block to that pile, of which that certain desired piece that would undoubtedly serve his purpose, is usually resting undisturbed at the bottom.

The pattern storage racks are next brought to view (Fig. 2). These racks showing how steelcrete was used to take the place of the old wooden shelving, whose greatest service was to collect dust. The same size of mesh as is used for the scrap lumber was laid across the racks and sectioned off four to five tiers deep, according to the magnitude of the patterns. Thus all the dirt that would collect on wooden shelving falls through to the floor, and is easily removed by sweeping. A card system should also be installed, each card tracing the identity of a certain pattern, as each pattern has its own number. The index cards kept on file should describe every pattern in such a manner as to enable any person to designate the details "upon order" of any certain pattern.

THE MANUFACTURE OF WROUGHT BRASS

A Description of Modern Methods for the Production of Plate, Sheet, Rod, Wire and Tube.

By L. J. Krom.

(Continued from March, 1912.)

REDUCING THE RODS.

After the rods have been rolled to ¾ in. and have been annealed and pickled they are ready for further reductions in size if they are going to be used for wire. If they are intended for drill rod stock or for other purposes requiring straight lengths, ¾ in. in diameter and larger, they are finished at the required size on the rolls and then run through a straightening machine, which produces straight lengths free from kinks and curves. Before the rods from the rolls can be drawn down further, the end of the coil must be reduced in size or "pointed." For this operation there are several styles of machine on the market; the one shown in Fig. 37 is one type.

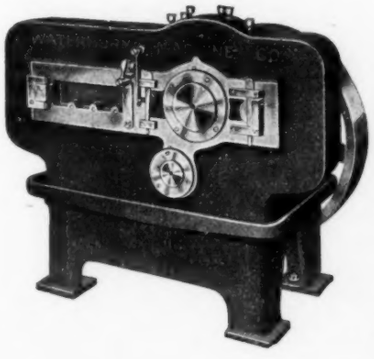


FIG. 37. TRIPLE DIE SWAGING MACHINE. MANUFACTURED BY WATERBURY FARREL AND MACHINE COMPANY, WATERBURY, CONN.

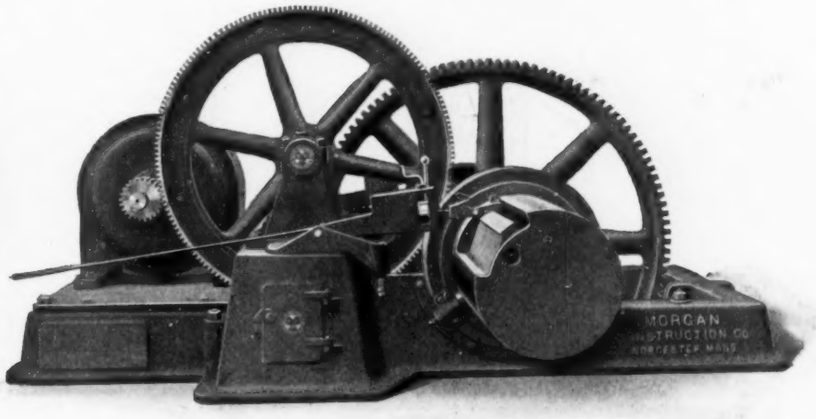


FIG. 38. HORIZONTAL BULL BLOCK. MANUFACTURED BY MORGAN CONSTRUCTION COMPANY, WORCESTER, MASS.

After the rod has been pointed it is ready to run on the two-man or horizontal bull block, as shown in Fig. 38. This machine takes the rod from the rolls at ¾ in. in diameter and pulls it to 7/16 in. in diameter, when it goes to the fire and pickle for another anneal and cleaning. From the horizontal bull block with a 44-in. drum the rod goes to the upright, or one-man, bull block, where it is drawn to 5/16 or ¼ in. in diameter, and is then ready for annealing and cleaning for further reductions on wire-drawing machines.

In the process of drawing rods on a bull block or on a wire machine, a lubricator is necessary, and the most used ones have tallow and soap for a base mixed with other substances. A very good mixture is 80 lbs. of tallow with 25 lbs. of yellow soap boiled down thick and then diluted until it has a consistency of light oil. Some mills use nothing but tallow packed around the die and the rod is drawn through it. One mill uses as a lubricator or dip on the multiple die fast running machines a mixture of 24 lbs. of Colgate's fig soap to 400 gallons of water. Of late the various soap manufacturing companies have "made up" mixtures which are studied out to meet the

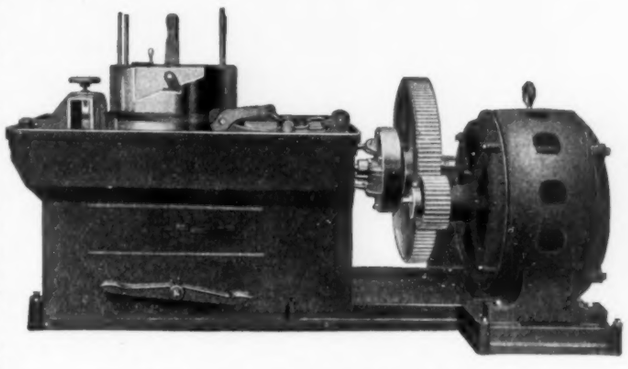


FIG. 39. SINGLE BLOCK WIRE DRAWING MACHINE. MADE BY WATERBURY FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

requirements in each case, and it is better to obtain the ready prepared lubricant than to attempt to mix it at the mill.

SINGLE AND MULTIPLE DIE MACHINES.

The machines used for the running down of the rod from ¼ in. to any required finished number or gauge are many and varied; a few types are shown in the pictures, as Figs. 39, 40, 41, 42, etc. These machines, as their name indicates, contain either one single die and one block or a number of dies with one block. Some of the single die machines are made up of from one to twelve blocks on one frame, making it possible, as shown in Fig. 41, to run twelve coils of wire at one time, making either the same reduction in each or twelve different reductions, but only one *reduction per coil at once.*

The type of machines shown in Figs. 42, 43, are known as multiple die machines, and contain a number of dies from four up to nine. This means that a single stand of wire will be strung through as many dies as there are on the machine, and the subsequent reductions are made in the one pull or draw. Some sample reductions are given below. On a six-die machine with wire beginning at .200 in. the reductions will be .164 — .134 — .109 — .090, and .081. On a seven-die, beginning at .237 in., then .185 — .147 — .118 —.094 — .075, and finish at .064. On a nine-die machine the draws would be, beginning at .185 in., then .156 — .127 — .104 — .085 — .070 —.064 — .058 — .049, and finish at .045. The wire, after it has been finally drawn to finished size, is left hard unless the orders call for soft or blue finish. In the latter case it is simply annealed in the muffle and pickled bright. Hard finished wire is usually tumbled in an iron tumbling barrel with a solution of argols and water boiled up with yeast. This gives the wire a bright and clean appearance, and it is ready to ship. (To be Continued.)

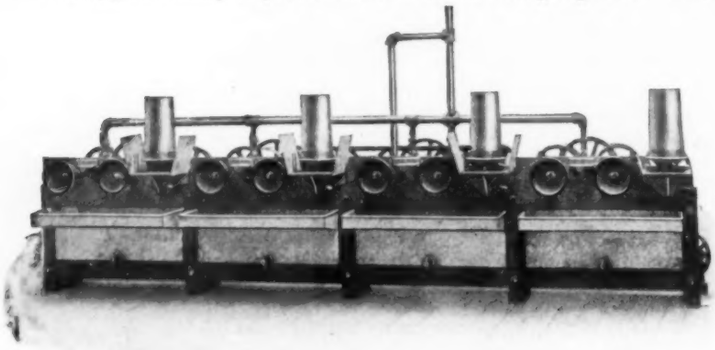


FIG. 40. FOUR BLOCK WIRE DRAWING MACHINE. MADE BY THE MORGAN CONSTRUCTION COMPANY, WORCESTER, MASS.

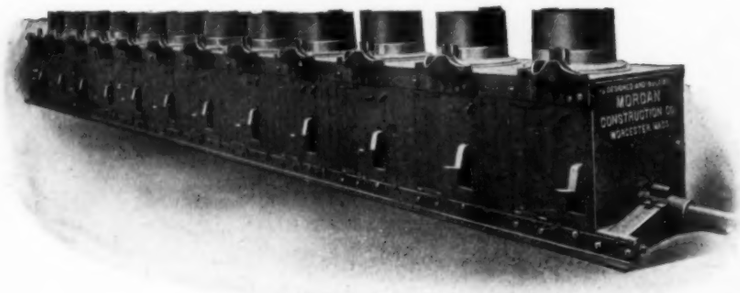
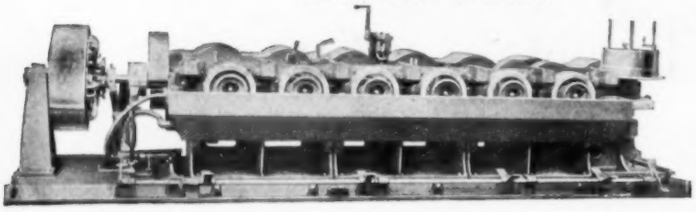
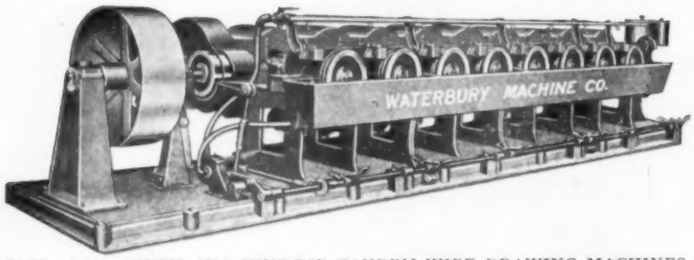


FIG. 41. TWELVE BLOCK WIRE DRAWING MACHINE. ALSO MADE BY THE MORGAN CONSTRUCTION COMPANY.





FIGS. 42-43. SEVEN AND NINE-DIE TANDEM WIRE DRAWING MACHINES. MADE BY THE WATERBURY FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

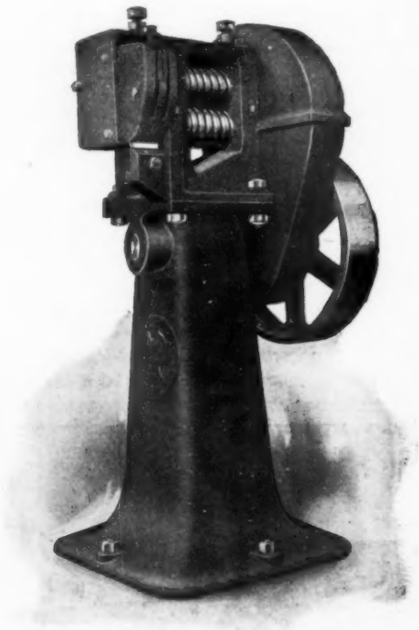


FIG. 44. ROLLER ROD POINTING MACHINE. MADE BY THE MORGAN CONSTRUCTION COMPANY, WORCESTER, MASS.

TREASURY DECISION.

BRONZE FIGURES TO HOLD CLOCKS ARE NOT PARTS OF CLOCKS.

The United States Board of General Appraisers, in denying a claim filed by T. Shingall, holds that ornamental bronze figures used as hangers or holders for clocks are not to be regarded as "parts of clocks" under the Tariff Act of 1909, with duty at the rate of forty per cent. ad valorem. The ornaments, comprising female figures, tiger heads, etc., were returned for duty at forty-five per cent. as "manufacturers of metal."

COPPER: ITS VARIATIONS AND MODIFICATIONS

By James Scott.

One of the most remarkable facts connected with copper is the multiplicity of names borne by its ores and products. These prove very confusing unless brought together under one heading, as I propose shall be the case in the present article. Just take notice of this list: azurite, black oxide, chalcopyrite, chessylite, copper glance, indigo copper, malachite, peacock copper, purple ore, red oxide, ruby copper, similor, sulphides of copper, tombac and verditer—blue and green. Surely the man who deals in any way with the metal or its origin must be excused for getting bewildered on these points. Native copper occurs less rarely than its ores as beautiful masses of octahedral crystals.

As oxidized ores it is found as cuprite, malachite and indigo copper, the two last being the most widely spread and important. Copper also exists as a sulphide along with sulphide of iron, i. e., pyrites, the brassy lumps often seen in coal. This mixture is called either copper pyrites, purple copper ore, or chalcopyrites. By the way, some mineralogists consider the iron pyrites to be a disulphide. The chalcopyrites are

FIG. 1. PEACOCK COPPER, SEEN THROUGH A MAGNIFIED PIN-HOLE. THE MAJORITY OF THE GEOMETRICAL CRYSTALS CONSIST OF DEEP BLUE SUBSTANCE.

somewhat soft and yellowish. It exhibits very beautiful colors, due to tarnishing. The chief English ores are azurite—which is also called lazulite, chessylite and blue verditer—copper pyrites or chalcopyrite, and purple copper-Malachite is a characteristic product of South Australia and is also found in America, Africa and Asia. Azurite is found principally in situations where the ore has been exposed to the influence of waters containing carbonic acid. It gradually changes to malachite, and is then green.

Malachite, which possesses very beautiful emerald tint, is also called green verditer, and is the foundation of many green paints. It is a carbonete of copper, and occurs along with azurite.

The name *cuprum* for copper was settled upon because of the metal having originally been obtained from Cyprus. For the purpose of extracting the metal there are two main methods called, respectively, the dry and the wet process, which are again capable of subdivison. The dry treatments involve fusion, and therefore depend on complicated reductions and reactions, while the wet ones include electro-chemical preparations. For the dry manipulation the ores are placed successively in a series of reverberatory furnaces. The mixed sulphides, containing 5 per cent. to 15 per cent. copper, are first heated in an air current, and are thereby *partly* oxidized. The resulting compound is then fused, whereupon the oxides and sulphides react upon one another and upon the companion ingredients, yielding cuprous (copper) sulphide, and ferrous (iron) oxide. The iron oxide is then made to combine with silica to form a slag. The cuprous sulphide so obtained is next heated and then fused, and by partly oxidizing produces cuprous oxide which reacts with the cuprous sulphide and evolves copper and sulphur dioxide, i. e., sulphuretted hydrogen, or sulphurous anhydride.

Many repetitions or slight variations of these treatments are often necessary. The crude copper obtained by these means is then refined by oxidation, the oxygen first attacking the impurities present. Sometimes

FIG. 2. INDIGO COPPER, SEEN THROUGH A MAGNIFIED PIN-HOLE. THESE ARE VERY LUSTROUS.

"poling" is resorted to near the end of the preparation. This practice consists of immersing into the molten mixture a long birch pole, anthracite being simultaneously added. The charred portions of the wood reduces the oxide, while the consequent agitation carries off impurities. This process is continued until the metal exhibits a satisfactory fracture and toughness. Mattes of sulphide of copper, usually impure, are now occasionally derived from blast furnaces, and then dealt with in a Bessemer converter. The required air is forced through the vessel sufficiently high to allow the reduced metal to remain uninterfered with.

Native copper is also similarly reduced. The oxidized ores, either natural or artificial, may be heated in a blast furnace along with coke or charcoal, whereupon the copper is liberated and carbon monoxide (coal gas) produced. The metal is then refined as previously described. The wet processes are (1) dis-

placement, and (2) electrolysis. Sulphuric acid is manufactured largely from iron pyrites, which contains small quantities of copper, silver and gold. The residues from the processes involved are roasted with common salt (chloride of sodium) in a current of air. The result is that the metals are converted into chlorides, which are then dissolved out. After the silver and gold have been propertly extracted the copper is precipitated by scrap iron, and is then refined in the usual manner.

For the electrical extraction of copper from the crude material impure slabs of the metal are hung as the anodes in tanks containing solution of copper sulphate, known otherwise as bluestone. The liquid is acidulated with additional sulphuric acid. The cathodes consist of thin sheets of pure copper opposite the anodes. Upon sending a current through the dynamo the copper leaves the impure slabs and is deposited on the pure sheets, while the refuse substances are either dissolved or precipitated. Copper melts at 1,050 degs. Cent., and boils at the temperature of the electric arc. Readers do not need reminding that it is an excellent conductor for electricity. Whereas copper will not tarnish in dry air, it readily develops a coating of green carbonate in moist air. When heated in air it yields two basic oxides—the red cuprous and the black cupric. The first is formed when the metal is in excess, and the second in cases where there is a superabundance of oxygen. Cuprous and cupric salts are derivable therefrom, the former being few in number and of far less importance than the latter. Both are *white*, or very faintly yellow, when powdered and completely anhydrous, i. e.; minus all traces of water. These white substances darken if exposed to the light, and become the poisonous blue and green salts when watered. The cuprous are readily oxidized to the cupric. Cupric sulphate, i. e., copper sulphate or bluestone, is one of the most useful. It is employed in calico printing, electrotyping, and is a prominent constituent of the Bordeaux mixtures which are sprayed over plants to serve as insecticides and fungicides.

Gorgeous rainbow colors appear while heated copper is changing to the red and black oxides. Alloys of copper include brass, Prince's metal, similor and tombac. Ancient brass consisted of copper and tin instead of copper and zinc, as at the present time.

Reverting for a moment to the oxides, it needs stating that the red (cuprous) when mixed with melted glass makes the latter blood hued, whereas when the black (cupric) is used for the same purpose, rich green tint results. By the way, the red oxide occurs in nature in the form of beautiful ruby red crystals. Copper can be removed from the sulphate (bluestone) by immersing in a solution of the latter a clean knife blade or any other steel or iron object. Within a short time a bright layer of the metal is deposited on the submerged portion of the article. Copper can be easily procured in a colloidal condition, that is, non-crystalline. It is then very hygroscopic, attracting water very rapidly from the atmosphere. Miscroscopical investigation is very useful for observing this peculiar feature.

The subjoined illustrations of the ores as seen through the compound microscope will no doubt prove of interest to everyone connected with the metal industry. The peacock copper grains are colored with the lustrous hues of that bird, and are shown in No. 1.

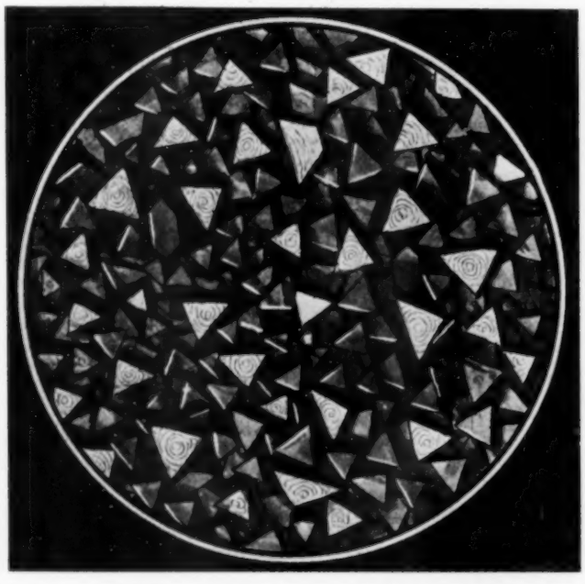


FIG. 3. A MAGNIFIED PINHOLE, SHOWING THE REMARKABLE APPEARANCE OF COPPER FROM A VOLTAIC BATTERY.

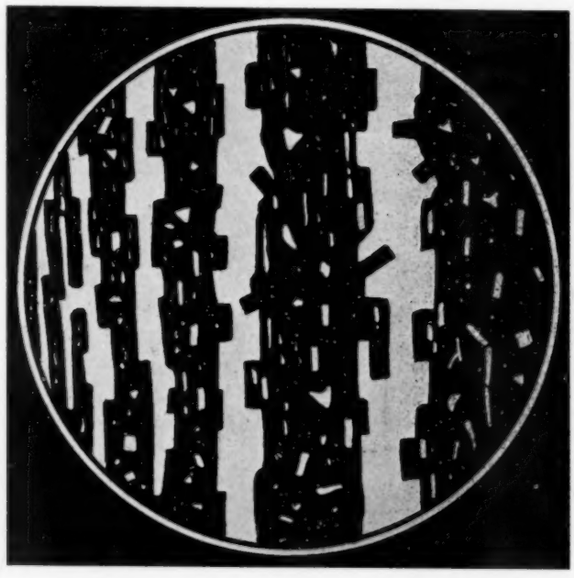


FIG. 4. UPON HEATING COPPER LEAF FOR SEVERAL HOURS IT CHANGES TO A BLACK OXIDE. UNDER THE MICROSCOPE THIS OXIDE IS DISCLOSED AS SHOWN IN THE ABOVE MAGNIFIED PINHOLE.

Indigo copper is minutely leafy or scaly and prismatic, being of a coppery tint. In form the particles somewhat resemble the flakes procurable when blue indigo powder is sublimed. This form of copper is shown in No. 2. A very attractive state of the metal is obtainable on the copper plates used in a voltaic battery. To the naked eye the surface is simply frosty looking or glistening, and varies from an old gold to a pale gold luster. When magnified, however, it is seen to be entirely covered with brilliant crystals of the kind shown in No. 3, very densely packed together. I heated in a glowing fire for eight hours a piece of copper leaf, which was fastened between two glass slides. After passing through all the colors of the rainbow the metal oxidized to the dark red tint. Upon magnifying the piece I found that many parts of it had changed to the black oxide, and in doing so had split into the symmetrical designs shown in No. 4, which must be regarded as crystalline in tendency.

NOTES ON COPPER

By Wirt Tassin.*

(Continued from July.)

OBTAINING CUPROUS OXIDE.

The cuprous oxide may be obtained by heating 5 parts of black oxide with 4 parts of the finely divided copper, or preferably by adding grape sugar to a solution of copper sulphate and then caustic potash in excess. Boiling the mixture deposits cuprous oxide. As less than 0.15 per cent. of oxide has no practical effect either on the conductivity or other physical properties of the metal, the first ingot should be made to contain that amount. As the oxide content increases from 0.15 up to 0.40 per cent. there is a loss in conductivity, but there is no other change in the physical properties. Therefore the next two ingots should contain 0.25 and 0.35 per cent. of cuprous oxide, respectively. With 0.45 per cent. there is a loss of ductility in the cold. The next series of ingots should then contain 0.45, 0.75, and 0.95 per cent. of oxide. With 2.25 per cent. of oxide there is a marked loss in ductility, even when hot, and with 3.00 per cent. hot shortness begins

FIG. 15. CROSS SECTION OF A COPPER INGOT 4 x 5 INCHES IN DIAMETER.

to appear, which is complete at 7.00 per cent. The standard ingots are ground, polished and etched for a fixed time period in a 15 per cent. cold solution of ammonium persulphate in water. A photographic record made. The samples preserved from tarnish and filed for reference. There are several ways of preventing tarnish. One method is to cover the surface with vaseline; another is to immerse the sample in oil; another uses celluloid varnish, or collodion varnish, or a varnish made by dissolving gun cotton in amyl acetate, etc. The writer has found that a half an ounce of paraffin wax melted and poured into benzine and then an ounce of blackfish oil added gives a perfect protective coat, and one that is easily removed.

DETERMINATION OF OXIDE CONTENT.

To determine the amount of oxide in an unknown sample, it is first ground, polished, etched for the fixed time period, and the structure so developed compared with that of the standards and the oxide areas measured. The measurements may be made with an ocular micrometer. This is a glass disk fitting the eye-piece on which a sufficiently fine scale, generally a tenth millimeter, has been engraved. In place of the eye-piece micrometer the writer takes a sheet of millimeter cross-section paper and photographs it, reducing the size of the image so that 10 squares will just measure one millimeter. A positive from a 4 x 5-in. negative, which should be entirely covered by the scale, is made on a lantern slide plate, and a cheap and easily replaceable scale ruled in squares a tenth

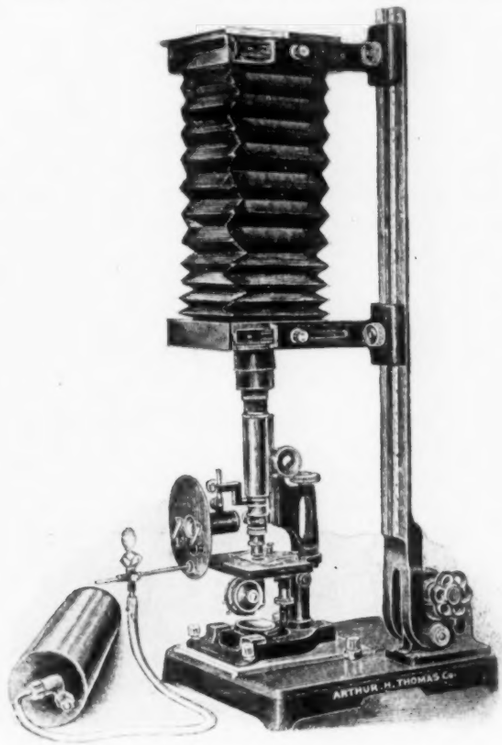


FIG. 16. TASSIN ILLUMINATOR WITH MICROSCOPE AND CAMERA.

of a millimeter on the side and covering an area of 3 x 4 ins. is obtained. The scale is laid on the ingot face and the oxide areas counted under the microscope. The procedure is as follows:

A test ingot of any desired size, one approximating that of the standards is best, is cast from the melt. One surface is then faced on an emery wheel, then trued on an iron lap with washed flour emery and water, washed, dried and buffed. It is then etched for a time period similar to that used in etching the standard ingots and in the same kind and strength etching medium. After etching the ingot is washed, dried and the oxide areas are measured and compared with the standard or its photographic record. The time required in skilled hands to prepare a 4 x 5 in. face on an ingot similar to that shown in Fig. 15, but not cut off, is about 10 minutes. The training required to perform the entire operation, grinding, buffing, etching and measuring, is directly comparable with that neces-

*Chemist and metallurgist, Washington, D. C.

sary to educate a boy to make color carbons in a steel-works laboratory. Until the operator is thoroughly familiar with the influence of the oxide and other elements on the grain, it is suggested that after etching the surface be lightly repolished, thus destroying the grain and leaving only the lines of oxide as in Fig. 17. This increases the time required, but also reduces the error arising from a lack of familiarity with the grain structure.

Any method of illuminating the surface that will get sufficient light through the microscope to the eye may be used. The writer has devised a low-priced, compact, portable piece of apparatus that can be attached to any microscope, and which possesses the advantage of having the source of light always traveling with the barrel of the microscope, thus permitting the use of any power and of any range of focus without disturbing the alignment of the illuminating arrangement. The apparatus with microscope and camera is shown in Fig. 16. It was described in the Iron Age and in the Iron Trade Review of June 9, 1910, and may be obtained for a nominal sum from Arthur H. Thomas Company, Philadelphia.

FIG. 17. COPPER IN RELIEF SHOWING OXIDE. x 150.

THESE FOUR PHOTO MICROGRAPHS SHOW THE EFFECT OF BISMUTH ON COPPER.

FIG. 18. 0.007% of bismuth.

FIG. 19. 0.020% of bismuth.

FIG. 20. 0.050% of bismuth.

FIG. 21. 0.100% of bismuth.

EFFECT OF OTHER METALS ON COPPER.

Bismuth unites with copper to form a bismuthide, and its effect, even in minute amounts, is decidedly injurious. Copper with as low as 0.005 per cent. of bismuth shows a marked lowering in conductivity. With 0.02 per cent. there is red shortness, and with 0.05 per cent. cold shortness. Copper with 0.10 per cent. of bismuth is practically unworkable and crumbles at a red heat. The melting point of the bismuthide of copper is below 300 C., hence the red shortness. Further, the compound is forced out between the grain walls, thus destroying their continuity, hence the lowering of the conductivity, tenacity and elongation.

The oxidized compounds of bismuth are less injurious than the bismuthides; it follows, then, that the presence of an amount of Cu_2O may counteract in part the harmful effect of bismuth. This tendency of cuprous oxide is materially increased in the presence of arsenic, so that by proper manipulation copper containing even 0.10 per cent. of bismuth may be made workable. Micrographs 18, 19, 20, and 21, respectively, show the structure of coppers with 0.007, 0.02, 0.05 and 0.10 per cent. of bismuth when etched with ammonium persulphate.

(To be continued.)

A NEW WHITE METAL ALLOY, ARGENTAL.

William H. McAdams, the inventor of the light, strong metal McAdamite, has now produced a new alloy of silver and aluminum. The new alloy has been named "Argental" from the Latin word "argentum" for silver and the first part of the word aluminum and has all of the qualities of silver except weight. The alloy can be cast, die-cast, rolled, spun, drawn into wire, milled, engine-turned, and turned in the best manner and the finest of threads cut on it. It takes a fine polish.

Argental has been produced to compete with silver, and for general manufacturing and industrial uses it is in many ways far superior to silver for the reason that, being alloyed with aluminum and cast by means of a patented compound and molds, or dies, it has many times greater strength than either silver or aluminum. It is white like silver and not leaden or blue like aluminum.

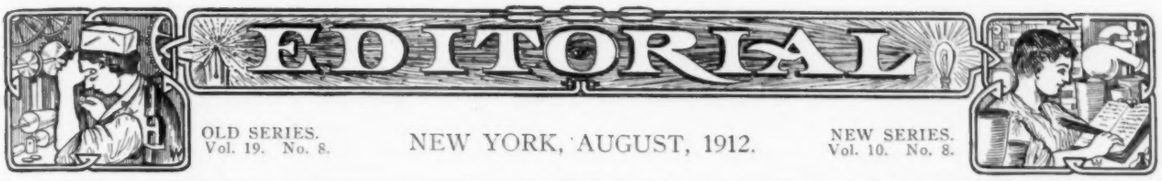
The silver in its composition prevents the aluminum from being attacked by ordinary alkalies, and the aluminum prevents the silver from being attacked by ordinary acids. The alloy cannot be affected by nitric acid, and it will not tarnish or oxidize, by exposure to the atmosphere or gases. Its specific gravity is only one-third that of silver, and consequently three or four times the quantity of manufactured articles can be produced from the same weight as that of silver, such as watch cases and movements, forks, spoons, bells, tableware, ornaments, hardware specialties, typewriters and similar machines, not mentioning a number of other incidental articles.

PLATING IRON WITH ALUMINUM.

In coating iron with aluminum the usual process is similar to what we erroneously call "galvanizing" or coating with zinc in a bath of molten metal. As a preliminary, of course, the article to be coated must be freed from any grease, rust and dirt, by pickling in dilute muriatic acid, and while still moistened with the acid it is dipped into the bath. As, however, aluminum in the solid state is acted upon by the acid in question, when an already coated article is to be re-coated with aluminum this acid can not be employed; further, the action of the acid on aluminum makes it inconvenient to employ it in establishments where a great deal of such work is to be done. It has, however, been discovered that besides muriatic acid, alcohol has the desired effect—and it shows this property even when diluted with water to such an extent that the mixture is not inflammable. This renders it available for use on a large scale, at the same time doing away with any danger of fire.

The dilute spirit may be used on articles already coated with aluminum, just as well as on those which have not been previously treated. The *modus operandi* is the same as with the use of muriatic acid. The iron, after having been well cleaned, is simply dipped into the diluted alcohol, and when equally moistened on all portions of its surface is at once plunged into the bath of molten aluminum. The process is repeated in exactly the same manner; if necessary, of course, any grease or dirt must be removed before dipping in the solution. The process is also available for coating iron with aluminum alloys.

ROBERT GRIMSHAW.



THE METAL INDUSTRY

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THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

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PALMER H. LANGDON - - - - - - - - Editor and Publisher
LOUIS J. KROM - - - - - - - - - - - Managing Editor
GEORGE W. COOPER - - - - - - - - - Advertising Manager
THOMAS A. TRUMBOUR - - - - - - - - Circulation Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
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AN EXHIBITION OF METALS

The intention of the exhibition of metals, the first of its kind ever held, which we deal with in full in this issue, was to illustrate not only the materials employed and the method of manufacture, but also the application of those methods. It is to be regretted that the exhibits of the latter class were not more numerous, and, indeed, the response of the manufacturers was scarcely adequate to the occasion. Of course, manufacturing processes involving the melting of metals could not be attempted in the Agricultural Hall; but, on the other hand, mechanical methods and carrying out certain processes might have been introduced. There was very little machinery in the Hall, and this fact appears to have been a source of considerable disappointment to a number of exhibitors. Apart from this notable omission, the exhibition, though small, illustrated very well the advances that have been made with non-ferrous alloys.

It is probable that from the bronze age downwards through the various periods of recorded and unrecorded time, the metals have been regarded as the most enduring of all substances furnished by the art of man. The ancient art products of China, Burma and Japan include remarkable examples of alloys of non-ferrous metals, and whatever physical or chemical changes they may have passed through, they are in many instances, so far as can be judged, entirely unimpaired by time. Ancient writers regarded with wonder the discovery of metals contained in ores. According to them a conflagration consumed forests which covered the outcrop of the metalliferous veins, reducing the metals and bringing them to the notice of man. There are, however, no grounds for inferring that the discovery of metals, other than "native," had any such poetic origin, but was brought about in a more commonplace and humble way. The extraction of the common metals from their ores did not require the elaborate furnaces and complicated processes of our own days. The alloys of copper and tin during the early metal age, and even somewhat later, were obtained, not by melting together copper and metallic tin, but by the reduction of oxidized copper ores containing tin-stone, or of copper ores to which tin-stone was added.

In view of the extended investigation now being undertaken in respect of modern metals it might perhaps be held that metallurgists of today have lost much of that knowledge won from experience by the corresponding experts of the dynasties. The explanation of course is that if enduring power and beauty of color and texture are alone to be considered, the problem of producing a suitable alloy is comparatively simple. The Inter-

national exhibition of alloys has demonstrated that the modern metallurgist is now called upon to produce a series of alloys for a variety of purposes undreamt of in ancient philosophy, and it is manifest that his chief trouble is to secure for his metal the required special characteristics demanded by engineers, and at the same time to retain a good surface, a sound texture, and a fair amount of durability and strength at moderate cost. The success was well illustrated by the exhibition, notwithstanding its shortcomings.

More than this cannot be claimed for the exhibition, which was woefully deficient in certain respects. Moreover, when we visited the Hall for the first time a good many of the stands had no one in attendance who could give reliable information, some stands being altogether deserted. A point which occurred to us in visiting the exhibition was the difficulty of drawing a hard and fast line between what is and what is not a non-ferrous metal. Certain metals or alloys may be non-ferrous themselves, but they are so closely connected with ferrous metals, and depend so largely, if not entirely, on this for their usefulness, that to attempt to sever this connection would at once cripple the value of such a collection of material as was on view at the Agricultural Hall. An interesting feature was the pathological section, which contained some valuable specimens, enabling one to make a close study of deformities, affections and indiscretions of the various alloys.

While there were no striking novelties displayed, the exhibition was no doubt valuable from an educational standpoint, since it demonstrated in unmistakable fashion the enormous importance of non-ferrous metals in modern engineering. We know well enough what difficulties our forbears had to contend with in the early days of these metals, and when we reflect upon the great developments which are to be recorded today we might unwittingly forget that with the discovery of non-ferrous alloys, we have one of the greatest turning points in the history of human progress. It needs no exhibitions to impress us with the importance of the future which lies before these metals, and great as has been their uses in the past (some of them, we fear, temporarily superseded) the cycle of time will bring round a period of prosperity which will eclipse even the present. It is singular to note that at the first exhibition for the promotion of trade of which there is any account we find mention of non-ferrous metals. King Ahasuerus, we are told, showed in the third year of his reign "the riches of his glorious kingdom and the honor of his excellent majesty." The locale of this function was at Shushan, and among the exhibits were silver rings and "beds of gold and silver, and," the narrative proceeds, "they gave drink in vessels of gold, the vessels being diverse from one another."

Human discovery has since brought to light metals not less durable, but considerably cheaper and more serviceable than those used in the remote days at Shushan. The 1912 exhibition may not have vied in grandeur with that of its historic predecessor, but it was perhaps of greater significance. Our only complaint is that it was not a sufficiently complete reflection of the enormous range which the non-ferrous metal industries has reached today.

The above remarks were written by our English correspondent and reflect the opinions gathered during a visit to the exhibition. After reading carefully what our correspondent has to say the thought occurs to us that the United States should have a similar exhibit. Such a thing has never been done as far as we know in this country, or in any other until this year. No exhibition devoted to metal alone has ever been attempted in the United States. The annual exhibition of the Foundry and Machine Exhibition Company to be held in Buffalo on September 23-27 this year is the nearest thing we have, but this is confined to foundry appliances and supplies, and finishing machinery. Why not go further and include plater's apparatus, supplies and manufactured metal products?

THE BUFFALO CONVENTION

Less than sixty days now remain before the 1912 conventions of the American Institute of Metals and Allied Foundrymens' Association and the exhibition of the Foundry and Machine Exhibition Companys take place in Buffalo, N. Y.

From present indications the event promises to be the greatest ever held. The question of a building to house the exhibition has been settled. One of the largest armories in the State of New York has had upwards of $200,000 spent on it to make it fit and we are assured that nothing has been left undone to provide ample accommodations for all who intend to exhibit. The main hall of this building is entirely in the clear and it has upward of 47,000 square feet of floor space. In the rear of this hall is a large administration building fitted up with offices, store-rooms, lavatories, etc., and containing two large meeting rooms, each of which is capable of seating nearly 1,000 persons. Surrounding the building is open-lot space having nearly as much area as that occupied by the building proper.

The arrangements for the sessions of the various organizations are also about completed. These will be held at the headquarters of the societies and will be a welcome change from last year. Papers to be read have been printed and distributed for discussion, and it is to be hoped that advantage will be taken of this and plenty of discussion sent in. The entertainment committee has been busy and visitors are assured of having every spare moment while away from the exhibition hall completely occupied in attending the various attractions offered. As a matter of fact, everything has been done that is possible by the Buffalo people and others interested in making the 1912 convention and exhibition a wonderful success. Nothing now remains but for the members of the associations to do their part by attending and every one interested in metals is strongly urged to do so. Remember the place and date, Buffalo, N. Y., September 23-27, 1912.

CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

A WORD ON CRITICS

To the Editor of The Metal Industry:

It has been the pleasure of the subscriber to read The Metal Industry for years, and many are the pleasant moments I have spent over the words of wisdom written by the men who think and *do* things. YET: I fain would register a kick against the unfriendly attitude displayed by many of the critics who ofttimes, without rhyme or rhythm, seek to disqualify what has been written, by uttering caustic remarks, and frequently make statements that are no more correct than those they seek to criticise.

It is seldom that an article on which much time and thought have been spent escapes the prod of the man who, not in so many words perhaps, tells us why *he* could have written that paper much better than the author, and would have done so had he only thought of it in time. He will then siphon off some of the solution in his think tank, which to him looks clear, but usually contains a copious precipitate of exaggerated ego. Much better would it be if he would incorporate his data in another article, giving all of the facts and figures obtainable on the subject from his point of view, and let the reader and experimenter judge for himself which of the several papers contains the best gems of thought, without wading through volumes of "platitudinous ponderosities" (whatever they are) that have only a tendency to divert the mind of the reader from the subject.

In the several volumes of The Metal Industry which I have before me, I find, under the head of "Acid Copper Solutions" that the various authors recommend the addition of everything from whiting to scrap iron in inorganic chemistry, except sulphuric acid; while in organic chemistry they consume everything from candy to the slaughter house products, to brighten the deposit or make it smooth, and judging from what I have seen, I would certainly hesitate to say that all of those mysterious mixtures are not twenty-four karat fine, if the local conditions were known.

In two factories known to me, acid copper solutions are in use. At one factory where large cylinders are plated, the plater believed it was unnecessary to add sulphuric acid, and therefore only sulphate of copper was added to build up the bath. There came a day, however, when the work could not be covered, and an analysis was made of the bath, which showed only .1 of 1 per cent. free sulphuric acid. This was increased to 1½ per cent.—presto, Richard was himself again. This condition of the bath is explained by the fact that as each cylinder was taken from the tank with a jerk, much solution was lost as drip, and as only blue stone was added to the bath, the little acid that is said to accumulate, was lost in the drip.

At the other factory the work is small and light, of such a nature that the solution is not carried out and lost as drip. Here we find that the acid is on the increase and is frequently converted into sulphate by the addition of carbonate of copper, after testing the solution volumetrically. Yet were these two platers to meet and compare notes, they would find that each pursues an entirely different course, and they are both right.

A third plater finds that along his line of endeavor he realizes nearly 100 per cent. efficiency from his outfit, and I may say that if one can be guided by his records of the chemicals added to the bath, he too is within the limit of error.

A fourth operator makes a statement that he uses no sulphuric acid in his duplex copper bath. His neighbors are mystified and would give considerable to know how he does it. So would Mr. Plater were he to admit the truth. However, upon investigation it is discovered that the only deposit he has been putting on his work has been done in the preliminary cyaniding of the sheets, and not in the acid copper bath which contains no free acid. An analysis of this bath proves that it also is shy "a few" of copper sulphate, the copper having long since left the solution on the back of the plates, sulphate of iron taking its place. The change came over the solution so gradually that it was not noticed by the plater, while he in his ignorance of the true condition imagined he had made a discovery. As a matter of fact his copper bath had been slowly changed to one of iron, and therefore worthless for copper plating. The sheets hanging in the bath received only a trace of metal, if any, and the analysis of this bath showed 2¼ ounces of copper sulphate and 40 ounces of iron sulphate to the gallon.

Here we have three acid copper baths that are being intelligently worked by competent platers, yet your critic could and would shoot their story full of holes, were they to write of their simple methods. There is no doubt but that glue, dextrene, alum and other slippery messes have their uses, even in copper solutions; yet it is a fact that good work can be done without their use, if the operator will only use his brain and a voltmeter occasionally. Too often published formulas and recipes for plating, sound a good deal like old Widow Benning's cake recipe, which is as follows:

A little crumb of sugar
A little dust of flour,
A little drop of milk,
A little dab of butter,
Do it down pretty considerable heavy
Bake with a right smart fire.

O Ye Critic—

Methinks that it would be a nice way to do to let him live if possible. Of course if he must be exterminated, why, there's the "gas."

Fred. J. Liscomb,
The Hanson & Van Winkle Company.

Chicago, Ill., August 1, 1912.

RUST PROOFING

To the Editor of The Metal Industry:

My attention has been drawn to a query and reply under "Rust-proofing," in your June issue. I am very much surprised to note that the correspondent (signed C. H. P.) who supplies the information has bodily lifted the subject matter of my U. S. A. Patent No. 594108. As the use of the process except under license from myself would involve serious consequences to any one operating with same, we shall be glad if you will kindly give due prominence to the fact that the said process is protected by Letters Patent in the United States, Great Britain, and all over the world.

T. W. Coslett.

Birmingham, England, July 1, 1912.

A RARE COMBINATION

The following letter just received, addressed to one of our authors, W. H. Parry, Superintendent of the National Meter Company, Brooklyn, N. Y., may prove of interest to other admirers of Mr. Parry's bright and happy style:

Dear Sir:

I remember that about three years ago I read an article of yours in The Metal Industry* on the subject of molding machines, which for raciness and sound common sense (a rare combination) would be hard to beat. It struck a happy medium between the man who wants to put an order for ten castings on an elaborate hydraulic molding machine, and the antediluvian foreman who considers molding machines a pest and an abomination before the face of the Lord. Not being the technical

*May, 1909.
†January, 1912, American edition.

man of this plant I, perhaps, was a little bit too much in the first category, but you may feel some satisfaction in the fact that the seed you have sown has not all fallen in stony places. Now you come along with an article, reproduced in the July number of the British edition of THE METAL INDUSTRY† on the subject of Pattern-Keeping, which once more hits the nail on the head. As it voices my own sentiments on the subject so exactly it looks like another case of two great minds thinking alike. If ever you come over to this side of the water I would be glad if you would come along and look me up at the address below. It is such a treat to find practical sense in either the technical or commercial press that it would give me much pleasure to meet you and, if you pay us a visit, we will kill the fatted calf for your entertainment. Yours faithfully,

F. W. GOWER, Manager,

For the Birmingham Aluminum Casting Co., Ltd.,
Birmingham, England, July 26, 1912.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY

CASTING

Q.—What metals other than white metal can be used to cast bushes in iron chill molds two feet long with three-quarter inch cores, and what is the method of doing the work?

A.—Standard phosphor bronze, copper 80, tin 10, lead 10, phosphorus 1, is often cast in iron molds. The rods are made of different diameters and cast as long as practical. They are put on the market rough turned and then bushes are made from them on screw machines.—J. L. J.

DIPPING

Q.—We are sending you a brass shell and ask if you can tell us how to get the finish that is thereon. Can it be obtained by acids as we have no sand blast machines?

A.—To produce finish as per sample shell proceed as follows: Dissolve in 38 degs. aqua fortis all the sheet zinc that it will absorb; this may consist of scrap metal. When the mixture becomes cool add oil of vitriol, 66 degs., with constant stirring until an equal amount of the acid has been added. Now cleanse the shells or similar articles from grease and immerse in the above dip for a few moments; then remove, wash in cold water and redip in a regular acid dip. This dip should consist of:

Aqua fortis	1 part
Oil of vitriol	1 part

and one ounce of muriatic acid to each gallon of mixed acids. This dip will give a bright tone to the satin finish produced in the satin dip, giving what is termed the ormolu or satin finish. If you require a dark tone, the same as your sample, prepare a dip by adding dry carbonate of copper to muriatic acid, from one-half to one pound or more to each gallon of acid. Then immerse the articles in the dip for a second or two; remove and dry without washing. This will give you the greenish tone and will darken the brass.

If your satin dip does not act upon the surface, add a very little water. If the satin or matt effect is too fine, add more aqua fortis and a very little muriatic acid; if too coarse add more oil of vitriol. Be sure to keep plenty of zinc in solution.—C. H. P.

GILDING

Q.—Please publish a formula for the gold or gilt finish, one that can be worked cold and cost as little as possible.

A.—Stoppers for perfume bottles and similar goods are cast up in molds from antimonial-lead alloys, and unless the articles are plated as quickly as possible after the casting, they become dull from the action of the atmosphere, and it is then difficult to produce a lustre by polishing, so this must be accomplished by the aid of solutions and dips.

The methods are as follows: (1) Flash the articles in a warm cyanide of copper bath or in a warm nickel bath. (2) Plate in an acid copper bath to prepare a surface for bright dipping. (3) Bright dip in a mixture of aqua fortis and oil of vitriol. (4) Flash in a warm bright brass solution to prepare the surface for gilding. (5) Gild in a warm gold solution. The action of cold gilding solutions are too slow and require too much gold to prepare. The simplest gold solution is prepared with cyanide and ammoniuret of gold and a little sodium bisulphite in the following proportions per gallon of water:

Pure gold, reduced to ammoniuret of gold	½ oz.
Potassium cyanide	1½ to 2 ozs.
Bisulphite of sodium	¼ oz.

Gold solutions made up from trisalyt gold salts are the easiest solutions to prepare, and give good results. The salt-water gold solutions are oftentimes used for gilding such articles. See articles on page 18, January, 1909, issue of THE METAL INDUSTRY. Solutions should be prepared so that the deposit comes perfectly bright without further polishing or coloring operations after plating.—C. H. P.

LEAKING

Q.—I have found in the course of my work, when I do pipe fitting on steam or water in my plating plant, I have considerable trouble with leaks at the elbows or tees. The couplings or elbows are tapped out too large for the pipe and they screw up all the way of the thread, do not make a joint, and leak badly.

A.—This question represents a difficulty which is met every day in plating plants all over the country. You will see steam or water leaking at some of the joints in nearly every plant you go in, which can easily be avoided by following this simple remedy, and 95 per cent. will be able to stand 200 lbs. pressure. For instance, if you have an ell or coupling that screws way up the pipe and have an idea that it will leak, remove same and take a piece of candle wick, unravel it and use two or three strands, wind it into the threads and then screw the fitting carefully back on the pipe. A little experience and care will show any person about how much candle wicking to apply each time to the particular ell. Tee bushing, plug, etc., that is used, and good results will be derived.—P. W. B.

MANUFACTURING

Q.—Please inform me if there has been any standard sizes adopted by the Brass Manufacturers' Association in the manufacture of hose couplings from ¾ inch to 4 inches in diameter, as we find a great variation in the diameters and pitch of threads in the smaller sizes.

A.—There has been no standard adopted by the Brass Manufacturers' Association on the above line of goods, though I am informed they have the matter under consideration. The National Fire Protection, May 26, 1905, adopted and has been approved by other organizations a standard size on the following: 2½-inch, 3-inch, 3½-inch, and 4½-inch sizes.—P. W. B.

MELTING

Q.—Kindly inform us what is the best furnace for melting down tin which is supplied in finely divided form. Also the best method of obtaining clean, sound ingots.

A.—If the tin dross contains much shot tin it should be "sweated" out by heating in an inclined iron pan. The residue of tin oxide is mixed with hard coal and fluorspar and reduced to the metallic state by exposing to a high temperature in a reverberatory furnace. It may be necessary to sweat the resulting tin several times before clean ingots can be obtained.—J. L. J.

OXIDIZING

Q.—Can you furnish me with a formula consisting of muriatic acid and arsenic for oxidize?

A.—To prepare such a solution proceed as follows: In one or more gallons of muriatic acid dissolve all the white arsenic, in powdered form, that it will absorb; then to each gallon of acid so prepared add four ounces of single sulphate of nickel, dissolved in as little boiling water as possible. To this, add one-half ounce of sulphate of copper and then mix with the arsenic and acid. The solution is now ready for use. A weak current and cast nickel anodes should be used. A solution that also gives good results is made by dissolving six ounces of white arsenic and eight ounces of caustic soda in each gallon of water. Use iron anodes and a low current. This solution gives good results for various metals.—C. H. P.

PLATING

Q.—Is there any new or improved method for reducing the temperature of plating solutions?

A.—We are not aware of any new method of reducing the temperature of plating solutions. It appears to us that the ammonia process, similar to the cold storage proposition could be utilized by passing the freezing mixture through lead or iron coils placed in the baths.—C. H. P.

Q.—I am having trouble in getting a satisfactory deposit in my Rotary Plater, but get very good results with my still solution. I have tried a strong solution with cyanide, also with copper, also a weak solution, but cannot get results. Any suggestions to remedy this trouble will be appreciated.

A.—The trouble you experience in not getting a satisfactory deposit with your Rotary Plater is due to the fact that your voltage is too low for nickel plating with a moving solution. Three to four volts will give sufficient strength to the current, but with mechanical platers the current should be double the strength or from eight to ten volts. The reason for this is the constant motion of the barrel offers a great resistance to the current and, of course, must be of sufficient strength to overcome the internal resistance created on account of the constant changing of the position of the articles. This is the reason why you obtain satisfactory results with the same solution and current of three to four volts using a still solution, and do not obtain the same results with the Rotary Plater. The solutions used in mechanical platers should also be increased in density, a nickel solution that will give satisfactory results at 5½ Baume with a still solution should be increased to 8 degs. Baume for a mechanical plater.—C. H. P.

Q.—We are trying to oxidize cast iron, using the following method: First the castings are pickled in hydrofluoric acid to remove sand, and then run in a cyanide copper solution for 30 minutes. Next they were put in our acid copper bath, which stands at 15 Baumé, but the deposit will only take on the edges. The acid attacks the center and brings off the cyanide deposit. We then added 150 ounces of powdered alum and sulphuric acid until the solution stands at 16 Baumé, but the results are the same. Can you help us out of our difficulty?

A.—Your solution evidently contains too much free acid. We suggest that you add more sulphate of copper, not by dissolving previously, but support in the regular dip basket and let the material dissolve over night. If your solution stands 18 degs. Baumé after this addition the results will be all right. Now add one-half ounce of common molasses to each gallon of solution. Your deposit should then be good and uniform. Do not add any more free acid in the future, as sufficient is formed in the bath continually. When you desire to replenish add the copper sulphate as stated above.—C. H. P.

Q.—Will you kindly give rules for keeping in condition a brass solution; that is, the best and most economical method of adding the metal, the cyanide, and how to ascertain when these should be added, and also in regard to adding soda or ammonia? The solution referred to is one used for plating brass articles that are soldered, to cover the solder.

A.—When a brass solution is in good working condition it is comparatively easy to maintain it so. The following rules should be followed:

No. 1. When the solution commences to plate a reddish earthy tone, a small amount of carbonate of zinc dissolved in ammonia should be added. For a 100-gallon bath, 4 ozs. of zinc and 16 ozs. of ammonia will change the bath to a yellow tone. Oftentimes half of this amount will answer.

No. 2. If the bath persistently produces a bronze tone, copper should be added in the form of a saturated solution of carbonate of copper and cyanide. Such a solution should always be prepared for reserve, as the addition of copper will also change the color rapidly from a reddish bronze to a brass yellow.

No. 3. When deficient in copper, carbonate of soda is oftentimes added as a conducting salt, when the brass deposit does not conduct freely, especially in depressions which show a reddish tone.

No. 4. Cyanide should be added only when the anodes become persistently coated with basic carbonate of copper or zinc. Anodes when in circuit should darken in tone, but, as soon as the articles are removed, within a few moments the anodes should become comparatively clean.

If these instructions are followed, a brass solution should give continuous results of a uniform color.—C. H. P.

SOLDERING

Q.—Furnish me a formula of a good soldering fluid for use with soft solders to be used on soldering brass to iron.

A.—To two fluid ounces of muriatic acid add small pieces of zinc until bubbles cease to rise, then add 5 per cent. of a teaspoonful of sal ammoniac and two fluid ounces of water. By the application of this to steel or iron they may be soldered without their surfaces being previously tinned. Be sure and see that the parts are clean and free from any dirt or foreign substance.—P. W. B.

SPINNING

Q.—What is the correct speed or revolutions per minute to run a lathe when spinning aluminum?

A.—A high speed about 4,000 feet per minute is best for spinning. This means that for work 5 to 8 inches in diameter, 2,800 to 2,600 revolutions per minute is good, while for smaller work of 4 inches this can be increased to 3,200 revolutions per minute. —P. W. B.

STRIPPING

Q.—How can the old silver be removed before replating britannia ware?

A.—In replating britannia ware when possible, the old silver should be removed, which can be accomplished by immersing in an acid strip, consisting of oil of vitriol one gallon and aqua fortis one pint. This mixture removes the silver quite rapidly. After stripping wash well, scratch-brush the articles to bring up the embossed work, then polish the plain surfaces, using a sand buff or tripoli, then cleanse for plating. After cleansing immerse in a mercury dip, consisting of

Nitrate of mercury	1 oz.
Sal ammoniac	6 ozs.
Sulphuric acid	½ oz.

This gives a coating of metallic mercury. If the mercury deposit is dull or spotted run the articles, before placing in the silver bath, through a cyanide dip. A silver strike may be used or the articles may be placed direct in the regular bath.

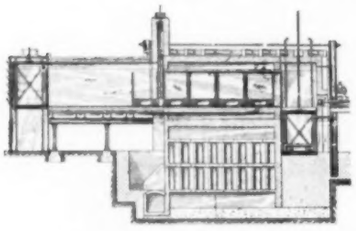
If you do not wish to acid strip the articles to be replated, remove the oxidation from the silver surface remaining with a strong warm cyanide dip, then wash carefully and dry. Now repolish with the methods mentioned above. Next cleanse and place in a cyanide of copper bath for a least five minutes, then remove wash and run through the mercury dip and finish in the regular manner mentioned.—C. H. P.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,027,471. May 28, 1912. Annealing Furnace. H. Gärtner Lintorf, near Dusseldorf, Germany.

This invention relates to an arrangement, as shown in cut, for annealing bright metallic articles in indifferent gases, the entrance and outlet openings being arranged below the filled annealing chamber or cooling-down chamber respectively. The subject invention differs from other known arrangements for this purpose by that at the outer ends of the annealing chamber and cooling-down chamber arranged in a straight line behind each other and closable against other by means of a damper, vertical shafts are provided, which can be closed below, and that in these shafts elevators are arranged, with which the charge to be annealed can be continuously introduced in large quantities and discharged respectively on trucks and the like fitting into the annealing and cooling-down chamber.



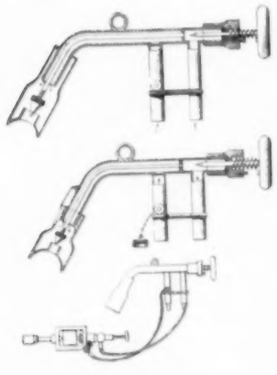
1,027,782. May 28, 1912. Metal-Plated Article. E. L. Watrous, Des Moines, Ia. Assignor to E. L. Watrous Galvanizing Company, of South Dakota.

The object of this invention is to provide an article of manufacture such for instance as a bolt and nut with a body portion, as shown in cut, made of a metal such as iron which is liable to rust and corrode with a plating or coating of a material such as zinc in which the inner layer of the plating or coating is formed integral or made homogeneous with the body, and the outer portion of the layer is made to conform exactly in outline with the surface of the body portion before the layer was applied, so that the finished article will have a coating or plating of non-corrosive metal so united with the body that it cannot be removed in scales or flakes, and so that the screw-threads can be accurately fitted to each other.

1,028,363. June 4, 1912. Blowpipe. B. L. Kissel, Joplin, Mo.

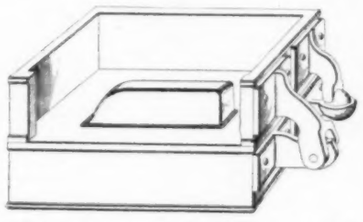
This invention relates to blowpipes, as shown in cut, and more particularly to that class of blowpipes to be used on metals that fuse only under the most intense heat; and is especially adapted for use in dentistry, or the like. The object thereof is to so construct the same that it will mix natural gas or artificial gas with nitrous oxide; or gas and air, or a mixture of oxygen and hydrogen, or the like, as may be desired.

A further object is to regulate the volume of the flame and produce perfect combustion of the gases used.



10,028,603. June 4, 1912. Flask for the Casting of Metal Bodies. Edward Pipher, of Port Hope, Ontario, Can.

In the operation of a continuous foundry plant in which the mold is prepared, the cast made, the contents of the flask dumped out, and the mold re-prepared in the same flask, frequently in a period of twenty minutes or less, the flask sides, when several casts have been made in quick succession, become heated and expanded to such an extent that the steadying members heretofore used, will not bring the flask parts together so that there will be an exact correspondence of the several sections of the mold cavity, and then the consequent result is defective castings.



1,028,895. June 11, 1912. Electrolytic Deposition of Metals. P. Marino, Regents Park, London, Eng.

This invention relates to the electrolytic deposition of gold, silver, platinum, copper, zinc, nickel, tin and lead or alloys thereof upon metal surfaces, and more particularly to the deposition of said metals or alloys upon iron or steel surfaces.

According to the present invention the electrolyte to be employed in the plating bath is prepared by dissolving the salt of the metal (or the salts of the metals, as the case may be) to be deposited in an aqueous solution of sodium or potassium glyceroborobenzoate (by preference sodium glyceroborobenzoate).

Sodium biborate (borax) is extensively used in autogenous or allogeneous soldering operations as a reducing agent or flux as it easily dissolves metallic oxides. Similarly, the reducing agent present in an electrolyte will dissolve any oxide, present on the surface of the article, which would detrimentally affect the adherence of the electrolytic deposit and this without affecting the surface of the article. Hence the electrolyte, prepared in accordance with this invention, pickles the article (*i. e.*, removes any scale or oxide present on its surface) concurrently with the deposition thereon of the metal in solution in the electrolyte, from which it follows that the adherence of the metal coating deposited on the article is considerably increased.

1,029,815. June 18, 1912. Crucible Cover. Thomas McGrath, Springfield, Mass.

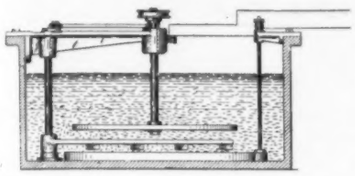
This invention relates to improvements in crucibles for melting metal, brass and all other alloys of metal; and the object of the improvements is to provide a cover, as shown in cut, which is separate from the crucible, which may be placed thereon when the contents are to be poured, and which when so placed will remain in position until the tongs are removed and until the operator sees fit to remove it.

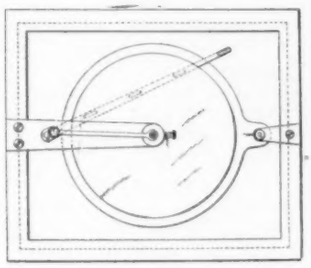
The inventor claims: 1. A crucible cover having attached thereto on its upper surface an arched spring with the ends of its members forming such arch extending vertically above the surface of the cover.

2. A crucible cover having attached thereto on its upper surface an arched spring with the ends of its member forming such arch extending vertically above the surface of the cover, and said vertically extending ends having lateral extensions attached thereto.

1,029,965. June 18, 1912. Process of Electro-Plating. Jonas W. Aylsworth, of East Orange, N. J., assignor, by Mesne Assignments, to Thomas A. Edison, Incorporated, of West Orange, N. J., a corporation of New Jersey.

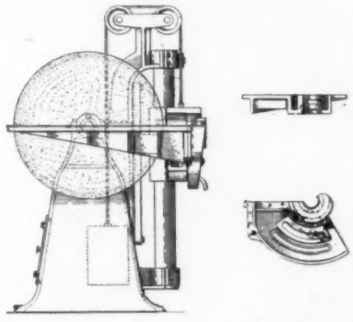
This invention relates to a process of electro-plating objects in an electro-plating bath, particularly to electro-plating sound record molds or other objects having delicate molded surfaces. Sound record molds or matrices usually formed of copper and having a sound record formed thereon in relief are preferably coated with an extremely thin protective coating of a hard metal, as nickel, in order to protect the same against wear during the operations of reaming or pressing duplicate sound records therefrom subsequently. If such a mold is made the cathode in an electrolytic bath and metal deposited thereon from the bath without especial precaution, bubbles of gas liberated in the electrolytic action tend to form upon the record surface and prevent a uniform deposit of the metallic film thereon.





The object is to obviate this difficulty and to produce an improved metallic surface by burnishing, as shown in cut, each microscopic portion of metal as it is deposited upon the object in the bath to cause the deposit to be formed with great uniformity and without injury to the molded surface, the burnishing means likewise serving to wipe away bubbles of gas as the same gather upon the molded surface during the electro-plating operation.

1,029,882. June 18, 1912. Disk-Grinder. John Miller, Jr., Beloit, Wis., assignor to Charles H. Besly & Company, Chicago, Ill.

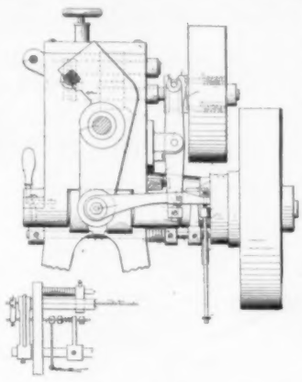


This invention relates to improvements in adjustable tables for use with disk grinders which embrace a column, a rotative disk provided with an abrading sheet or other working face, and a table located in front of the disk with its rear edge parallel to and closely adjacent to the plane of said disk, said table being adapted for the support of the work-piece in engagement with the working face of the grinding disk.

1,030,972. July 2, 1912. Process for Direct Nickeling of Aluminum or Alloys Containing Aluminum. Marc Chirade and Joseph Cauae, care of J. P. Bonicart, 16 Place de la Republic, Paris, France.

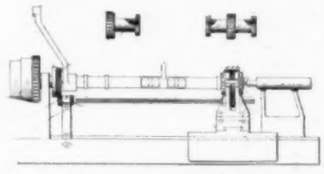
The invention relates to improvements in processes of direct aluminum nickeling. The object of the invention is to enable any article of pure aluminum or alloy containing same to be nickeled directly. This object is attained by the following process: 1. Immerse the article to be nickeled in tepid water, next wash it in ordinary water containing 2 per cent. of cyanide of potassium. The article is left about 30 seconds in the latter composition and then washed with very clean water. 2. Immerse the article, after the above treatment, in the following composition: hydrocholoric acid ½ liter, distilled water ½ liter, chloride of iron, 1 gram. 3. Wash the article in clean water and immerse in nickel bath by furnishing an electrical current of three volts; after five minutes, again wash in boiling water, preferably, and finally dry by any convenient means.

1,030,930. July 2, 1912. Wire Straightening and Cutting-Off Machine. E. F. Shuster, New Haven, Conn.



This patent covers improvements in wire straightening and cutting-off machines more particularly with reference to means for actuating the cutting-off and feed-roll mechanism. As shown in cut, the machine comprises a cam shaft, a clutch lever associated therewith, a cutting-off lever actuated by the shaft, a pivotally supported trip lever movable with the cutting-off lever with its free end normally supported on the clutch lever, feed rolls and shafts therefor, a continuously running balance-wheel pulley and a sliding clutch sleeve mounted on one of the feed-roll shafts, and a pivotally supported spring-actuated shift lever having one of its ends connected with the sliding clutch and its opposite end detachably connected with the trip lever.

1,030,981. July 2, 1912. Attachment for Turning Lathes. C. L. Dickert, Macon, Ga. Assignor of one-third to C. W. Rice, and one-third to W. A. Chapman, both of Macon.

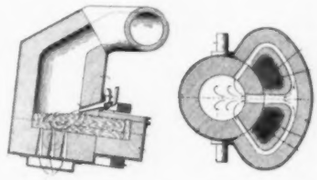


The invention relates to attachments for turning lathes. One object of the invention is to provide an attachment for turning lathes, as shown in cut, whereby when the work will not swing clear of the lathe shears the tool may be revolved instead of the work. Another object is to provide an attachment of this character adapted to be applied to the lathe carriage in place of the tool head and having means to operatively connect the same with the driving mechanism of the lathe.

1,031,257. July 2, 1912. Process and Apparatus for Extracting and Refining Metals and Alloys. A. E. Green, Chicago, Ill.

This invention relates to a process and apparatus for extracting and refining metals and alloys in general, and more particularly such metals as copper and iron.

The object of the invention is to provide a furnace of such construction, as shown in cut, as will permit of the usual treatment of the metal to whatever extent is desirable and will then permit of such additional combined electrical and gaseous treatment as may be necessary to produce the required product.



As a process one feature of the invention consists in producing a flow of electric current, preferably by induction, in a definite path in a bath of molten metal and in meanwhile blowing the bath with a gaseous mixture in such manner as to cause a continuous circulation of the metal in a path corresponding to the path of flow of the electric current, the composition of the gaseous agent being such as to assist in the desired refining operations of the bath.

Another feature of the process consists in partially refining the metal or alloy in the usual manner in a converter and then electrically heating the bath in said converter, meanwhile blowing the bath with a gas or gaseous mixture, preferably consisting wholly or in part of the exhaust gas from the converter.

The apparatus of the invention consists of a furnace, such as a converter, provided with means for producing electric heat localized at a particular place or in a particular path in the furnace, and also provided with twyers arranged to direct a current of gas into the bath in such direction as to produce a circulation of the metal from the less heated portions of the bath to the point of application of the electrically produced heat.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

INDUSTRIAL RAILWAYS

Narrow gauge railway systems are applicable to every industry and service where the reliable movement of material is essential and where large initial loads are moved irregularly or intermittently. Such a system, as a productive factor, can and should be judged in much the same manner as the productive tools and machines; that is, by balancing the time and labor saving, general convenience and efficiency increase on other tools against maintenance expense and interest on original investment. The economies obtainable are best evidenced by use and continued extension of such systems in many power plants, foundries, machine shops, chemical works, smelters, coaling stations, brick works, wood shops, warehouses, etc.

C. W. HUNT INDUSTRIAL RAILWAY SYSTEM IN PLANT AT ANSONIA, CONN., OF THE ANSONIA BRASS AND COPPER BRANCH OF THE AMERICAN BRASS COMPANY.

Shop railway system without provision for power on the cars can be profitably applied almost wherever the movement of material, either finished or raw or both, is done by hand truck or wheelbarrows and averages three or more tons per day. *One* man, for instance, with a shop car should easily be able to move on level track, a one-ton load that could not be handled in the same time with wheelbarrows by *five men*. With cars operated electrically from storage batteries, trolley or third rail, the loads that can be carried are limited only by the strength of the cars and track. The loads on cars can generally be apportioned according to requirements up to a maximum car load of about ten tons, a load distribution of one to three tons per car, under average conditions being very effective.

The illustration shows a practical application to the metal industry based upon the Hunt Industrial System, the parts of which are manufactured by the C. W. Hunt Company, West New Brighton, N. Y. In this system the standard gauge of track is 21½ inches, measured from outside to outside of rail heads, and loaded cars of standard width require a passage of 4 feet clearance. Track and cars of other gauge are, of course, usable as the conditions may demand. In the Hunt system the track sections, switches, frogs, crossovers, etc., are made up on the interchangeable sectional unit plan much the same as are modern filing cabinets. Any workman of ordinary intelligence can put the sections together and get the whole system ready for use. Should the movement of material change or extensions be required, this unit system of construction lends itself in a most flexible way to such changes or additions. Equipment of cars can also be made standard and interchangeable to the greatest possible extent, which effects great convenience and economy.

An exclusive and unique feature of the Hunt System is the employment of a flexible running gear and outside flanged

wheels on the cars and a special construction on the outer rail of curves, by means of which, as claimed by the manufacturers, a loaded car runs around a curve of as small a radius as 12 feet as safely and requiring as little power as on straightway. It is evident that with such flexibility of the system, the cars of a narrow gauge railway can reach any point that could be reached by trucks and wheelbarrows, including the movement of cars to different floors by elevators.

SCHOOL OF ELECTRO-PLATING AND CHEMISTRY

The photograph below shows the apparatus that will be used by the student in the plating school which will be opened in New York in the early part of October. This school, as was stated in the July number of THE METAL INDUSTRY will be started by Herman Reama, an expert electro-plater and chemist of many years experience, and Allen Field, an expert analytical chemist, who is well known for his connections in the manufacturing of chemicals. The school will be devoted to the teaching of electro-plating of all metals, and also to the chemistry of plating. Mr. Field says: "The course in chemical analysis that this school will give cannot be had at any of the technical schools or colleges, as the courses now given are of a general character and that offered at any college," is not surprising. Every possible device will be supplied to fill the needs of each individual so that any and all experiments can be fully demonstrated.

It is believed that this school will supply the need, that has been growing more and more apparent within the past few years, of the practical plater for an opportunity to become better acquainted with the scientific details of his trade. The plater who has reached the years of discretion without having had means or opportunity to enlighten himself regarding the mysterious workings of the plating operations can now supplement his practical experience with a knowledge of the chemical rela-

CHEMICAL LABORATORY AND OUTFIT WHERE THE STUDENTS OF THE NEW PLATING SCHOOL WILL PERFORM THEIR EXPERIMENTS.

do not specialize in the analysis of plating solutions. The time necessary to complete a chemical course in any of these schools is about four years, after which time the graduate is not yet fully qualified to analyze the plating solutions and will have to try out methods to find the most suitable one that is accurate and also short. The methods of analysis that will be taught in the plating school are the result of years of study and experiment, of which the student will derive the full benefit.

"To have accurate methods to follow can be appreciated the most by those who have tried to follow methods as given in the chemical text-books, and have no doubt found the results very far from being accurate. Very few of these methods are given a sufficient test for their accuracy before being published.

"A course in the school will benefit anyone connected with the plating line, regardless of what kind of plating he is interested in, as the course includes any kind of plating to be found in the shops."

In the light of the above, the statement, "that the principals are exercising every effort to make this course far superior to

tions of his working materials, and the chemical reactions resulting from their combinations.

The school will be incorporated shortly and will be conducted on a strict business basis. A certain fee, not yet decided upon, will be charged for the course, and in addition to this a deposit will be required of each student to cover the cost of chemicals used, breakage and wear and tear upon apparatus. At the end of the course the student will be given credit for all apparatus returned by him in good order, and the value of them returned to him in cash.

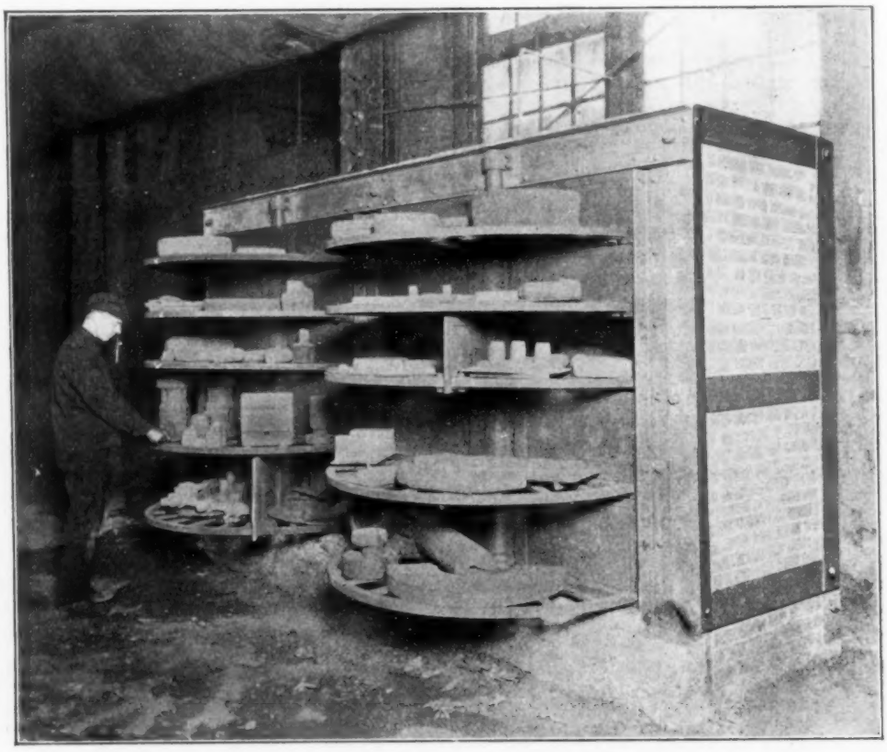
The course itself will embody a series of actual operations in plating and chemistry supplemented by lectures and hours of instruction. The data comprising the above will finally be incorporated into text books of convenient size for carrying in the pocket and will be published and sold to students and others interested at a figure well within the reach of all, probably $1.25 per copy will be the limit of price. Further information in regard to the school can be had by writing to the Plating School, care of THE METAL INDUSTRY.

REEL TYPE CORE OVENS

The Reel Oven (patent pending) here shown is built especially for small cores. By means of the Reels, each revolving on its own ball bearings, independently, any length of baking time may be obtained. This does away with all unequal baking. The Reels, half in the oven and half out, serve as racks and continuous baking results. No time is lost, no heat is lost and uniform temperature throughout the oven is obtained and maintained. On account of the continuous baking feature—that of keeping the temperature uniform, the Reel Oven will bake cores more uniformly and in less time than any other type made. The combustion chamber if possible should be located below the floor level, but if necessary may be located above the floor line, in which case the distance between Reels must be less or fewer Reels installed.

The Reel Oven built of first quality red brick, is supported by reinforcing angles and tie rods, and is so arranged that the steel frame is self-supporting. The reels or shelves are 4 ft. 11½ ins. in diameter, of heavy cast iron, each half containing more than nine ft. sq., and have suitable seals, to prevent loss of heat. To facilitate repairs, the reels are made in halves and are so arranged that one-half or a complete reel, or all the reels may be instantly removed.

The combustion chamber, built of fire brick, is located below the oven proper, and is separated therefrom by a perforated tile. Combustion takes place here, and the heat passes through the openings in the arch heating every part of the oven to a uniform temperature. For each chamber a vent flue pipe, with sliding damper, is provided to let off the vapors arising from core baking. These ovens are built by the Rockwell Furnace Company, New York, and are described and illustrated in Bulletin 31, just issued.



BATTERY OF TWO OVENS, WITH FIVE REELS. ROCKWELL FURNACE COMPANY.

AMERICAN MUSEUM OF SAFETY

One of the most interesting exhibits of apparatus devised for the safety of workmen engaged in metal melting is to be seen at the American Museum of Safety, 239 West Thirty-ninth street, New York. This device consists, as shown in the cut, of a cover mechanically fastened by a self-locking handle to the crucible, after placing it in the shank. The safety cover also prevents the oxydization of the metal, and reduces fumes to a minimum. The graphite lid fastened to the cover makes skimming unnecessary, thereby saving loss in metal.

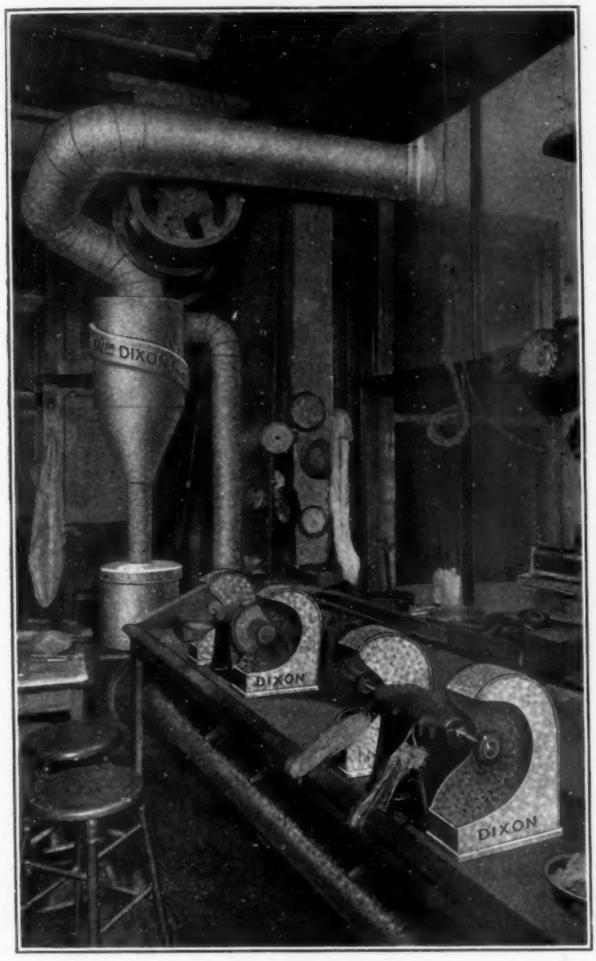
The apparatus shown is only one of a large number of similar schemes for the conservation of life and limb which the American Museum is fostering. There is also a display at the museum of asbestos mittens, leggins and aprons which are especially adapted to foundries making light work; these protective devices enable the men to handle the metal more quickly, through the knowledge that they will not be burned by the spilled metal, or their arms blistered while carrying the hand ladles.

A PROTECTIVE DEVICE FOR CRUCIBLES USED IN SOME CONTINENTAL BRASS OR ALLOY FOUNDRIES.

The object of the American Museum of Safety is to prevent accidents to workers in every industry; in other words it conserves human life. The officers of the association are: Philip T. Dodge, president; Charles Kirchhoff, vice-president; T. C. Martin, chairman, executive committee; Prof. F. R. Hutton, chairman, board of exhibit approval; William J. Moran, counsel; Robert A. Franks, treasurer; William H. Tolman, director. A number of booklets have been issued by the museum, and they are as follows: Safety Manual No. 1. Alcoholism in Industry: Some European Methods of Prevention. Price ten cents. Safety Leaflet No. 1. Presses and Punches. Safety Leaflet No. 2. Safety for the Molder. Others in preparation. Price of Safety Leaflets, $2 per 100. Every workman should have these publications.

DIXON'S DUST COLLECTOR

This dust collector or separator is for the purpose of collecting all the dust, lint, dirt, etc., from the polishing bench and separating it in such a way as to deliver all this dirt and dust into a convenient receptacle while the air passes through the top or may be piped out of the building, as not a particle of dust can escape after passing through the collector. The illustration is a reproduction of a photograph taken in a jewelry factory, showing a section of the shop with four spindles and



DUST COLLECTOR IN JEWELRY SHOP, SHOWING FOUR POLISHING SPINDLES.

respective hoods. The collector in this instance is fastened to the wall and piped out of the window.

The construction of the collector is such that the dust and dirt separates itself from the air—as soon as the air is forced into the collector. The air follows the curves of the collector, giving it a centrifugal motion, and gradually loses its momentum. The dirt and dust being heavier than air drops into a receptacle attached at bottom of the collector, and the air being separated from any particles of dust or dirt passes up through the center of collector and may be piped out of the room. The collector is made in ten sizes. For prices and further particulars, write to William Dixon, Inc., 39 John street, New York, who is the manufacturer of the system.

HIGH-PRESSURE GAS BURNERS

The gas burners, blow pipes and soldering irons, shown in the cuts and described below, are manufactured by Alldays & Onions, Pneumatic Engineers, Birmingham, England. Fig. 1 shows Alldays High-Pressure "Empire" blowpipes which are designed specially for use with compressed gas, such gas being delivered in high-pressure mains from the gas company or taken from the ordinary supply by means of an exhauster, and delivered at the required pressure to the blowpipe or burner. No blower or bellows being required to deliver air, as the jet under pressure will take up the required amount of oxygen from the surrounding atmosphere and neglect the other ingredients, which are useless for combustion and which in the ordinary burner are delivered to the flame and a considerable amount of heat wasted on them. This is why the high-pressure system is so superior, no heat units being wasted doing useless work. The flame from these burners is much more intense than that of

FIG. 1. ALLDAYS & ONIONS' HIGH-PRESSURE GAS BLOWPIPE.

the old method; therefore, brazing or heating is very much quicker and a considerable saving of gas effected, at least 10 to 15 per cent. A simple lever gripped by the hand when using the blowpipe governs the size of the flame at the will of the operator; the flexibility of control may be seen from the following figures, supplied by the Birmingham Gas Company. Pressure of gas in the main 60 ins. water gauge.

BLOWPIPE SIZE H.G. 2.

Consumption of Gas in cubic feet per hour.	Length of Flame in inches.	Diameter of Flame in inches.
25	8	1¼
50	10	1¾
75	14	2½
100	16	3

In each test the gas consumption was taken on a continuous run of one hour, but in actual practice the consumption for each size of flame would be much less, as obviously the operator would loose his hold several times during that period, and the flame would go out, leaving only the very small pilot light. The gas supply is controlled by a needle valve at the nozzle, and no matter what amount of gas is passing the pressure remains the same; this is an important feature.

The "Empire" soldering iron shown in Fig. 2 is a very handy and convenient tool, always ready for use and is far more eco-

FIG. 2. ALLDAYS & ONIONS' GAS SOLDERING IRON.

nomical than the ordinary tool. The gas supply being under pressure, a very fine pin-hole only is required at the end of the burner and the rubber tube is so small and light that no inconvenience is felt by the operator. The heat can be regulated at will and the copper bit maintained at a uniform heat.

WOOD FLOORING

Plain wood has not been practical as a street pavement nor for many instances in flooring. The main difficulties have been the rapidity with which it decayed and wore out. The overcoming of these two objections has been brought about through the industry of creosoting. This has filled an urgent need and opened a vast field to the uses of wood. Creosote is a by-product of coal tar and is a natural germicide. Creosoted wood blocks are rectangular in shape, being 3 inches in depth—parallel to the fibre—a scant 4 inches in width, and varying in length from 5 to 10 inches. They are uniform in dimension. The creosote oil is forced into the cell spaces between the fibres by high pressure until the proper amount has been injected. This is generally 12 or 16 pounds to a cubic foot of lumber as requirements call for.

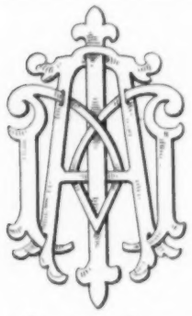
When the blocks are laid they are put down with the grain

vertical and fitting closely together. Wear is a matter of compression of the wood fibre. This has shown to be between an eighth and a quarter of an inch under traffic in large cities after being down for over ten years. A floor constructed of creosoted wood blocks is sanitary, smooth, noiseless and durable. When tools or castings are dropped upon this kind of a floor, no injury comes to either. There is no depreciation to a creosoted block floor, and those who have used it are completely satisfied. It is said to be ideal for machine shops and foundries. These floors are furnished by The Kettle River Company, Minneapolis, Minn. Among some of their most notable installations are the American Steel Foundries Company at Indiana Harbor and East St. Louis, Mo., and the Moore & Jones Brass and Metal Company, foundry floor, St. Louis, Mo.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN INSTITUTE OF METALS



President, L. W. Olson, Mansfield, Ohio; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held at Buffalo, N. Y., September 23-27, 1912.

Secretary Corse reports the following list of new members since July 1:

American Manganese Bronze Co., Holmesburg, Philadelphia, Pa.

Walter Arthur, General Electric Co., Schenectady, N. Y.

Bradford Motor Works, Bradford, Pa.

R. S. Buch, A. Buch & Sons Co., Elizabethtown, N. J.

Patrick Doyle, Worcester Brass Co., Worcester, Mass.

Erie Specialty Co., Erie, Pa.

Otto Gerline, Three Rivers Brass Works, Three Rivers, Mich.

H. W. Johnson, Fairview Foundry Co., Detroit, Mich.

Wm. J. Maton, Waterbury Farrel, Fdy. & Mch. Co., Waterbury, Conn.

Prof. Chas. L. Parsons, Bureau of Mines, Washington, D. C.

Geo. Petinot, Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

W. R. Strauss, 1812 Eutaw Pl., Baltimore, Md.

Dr. John F. Thompson, Monel Metal Mfg. Co., Bayonne, N. J.

Dr. Ezekiel Weintraub, General Elec. Co., West Lynn, Mass.

W. H. Bassett, American Brass Company, Waterbury, Conn.

E. T. Clarke, T. McAvity & Son, Ltd., St. John, N. B., Can.

Isador Ladoff, Research Laboratory, Westinghouse Electric & Manufacturing Company, E. Pittsburgh, Pa.

The Committee on Standard Test Bars for Brass and Bronze held a meeting at the Union League, Philadelphia, on June 27, at which a tentative program was outlined for the work of the committee which will probably be done at the Bureau of Mines, Arsenal Grounds, Pittsburgh, Pa. The following were present: G. H. Clamer, Chairman; C. R. Spare, J. L. Jones, also Mr. Howard, representing Dr. Stratton of the Bureau of Standards.

In connection with the convention, the railroads have granted reduced rates on the certificate plan as specified below:

Trunk Line Association, New England Passenger Association, and Eastern Canadian Passenger Association have granted fare and three-fifths, plus 25c. on depositing certificates. This embraces territory east of Manitoba, Windsor, Erie, Pittsburgh, Wheeling, Parkersburg; and north of Charleston, W. Va., and Washington, D. C.

To take advantage of this, when arranging for transportation purchase a full fare single fare ticket and ask for a certificate in connection with the Foundrymen's Convention in Buffalo. When arriving at Hotel Headquarters, turn this certificate—with 25c. charged by the railroads—in to the secretary in charge of registration.

AMERICAN SOCIETY FOR TESTING MATERIALS

President, Henry M. Howe, New York; Secretary-Treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa., to whom all correspondence should be addressed. The society is affiliated with the International Association for Testing Materials and is a corporation formed for the promotion of Knowledge of the Materials of Engineering and the Standardization of Specifications and the Methods of Testing. Meets annually, the time and place being fixed by the Executive Committee.

The Sixth Congress of the International Association for Testing Materials will be held in the Engineering Societies Building, 29 West Thirty-ninth street, New York City, September 2-7, 1912. Admission will be restricted to members of the International Association and of the American Society which is affiliated with it, and to duly appointed delegates from foreign countries and scientific bodies. The Congress fee is $5 for members and $3 for ladies accompanying members. Already a large number of delegates have been appointed and the indications promise that the occasion will bring together a larger number of people, interested in the materials of construction, than has ever previously gathered. The technical proceedings of the Congress will be unusually valuable. There are about 170 foreign and about 35 American papers in the list, many of which have already been printed and distributed. It is desired that the discussion of papers and reports be full and thorough, within the necessarily limited time of the sessions. With this in view it is urged that discussions be prepared in advance of the Congress, if references, figures, and similar material are available for citation. Discussion prepared in advance and submitted in writing will have precedence over impromptu discussion.

ELECTRO-PLATERS' ASSOCIATION

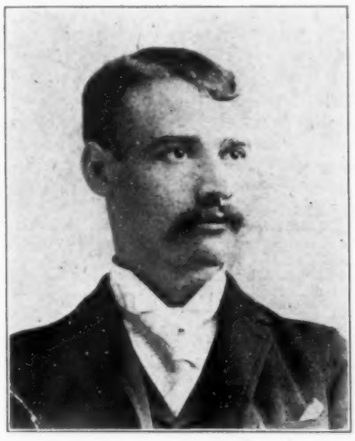
President, Richard H. Sliter, Jersey City, N. J.; Recording Secretary, A. J. Stremel, Brooklyn, N. Y. All correspondence should be addressed to the Secretary-Treasurer, Royal F. Clark, 246 Fulton avenue, Jersey City, N. J. This is an educational society, the objects of which are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23d street, New York, on the fourth Friday of each month, 8 p. m.

The July meeting of this association was held on the 26th. with thirty members present. Oswald Yarrer was elected to active membership. It was decided to hold a Shore Dinner on August 24 at the Seaside Hotel, Rockaway Beach. Members, their wives; sweethearts and friends are cordially invited to attend. Thomas Haddow exhibited fifty different samples of finishes on novelty work, and a discussion on copper cyanide solutions and spotting out took place.

ITEMS OF INTEREST TO THE INDIVIDUAL.

PETER W. BLAIR

Peter W. Blair, the subject of this sketch, is at the present time forty-seven years of age, and has been for the past eleven years employed by the H. Mueller Manufacturing Company of Decatur, Ill., large manufacturers of plumbing steam, gas and water works high grade brass goods, in the capacity of foreman of the brass finishing department. Previous to that he was general foreman for Richter Brothers and the Miami Brass Company, both of Cincinnati, Ohio. Mr. Blair also held a responsible position in the employ of The Powell Company, also of Cincinnati, for a number of years. Mr. Blair is well known to the readers of THE METAL INDUSTRY as the writer of articles dealing with the different phases of the manufacture of plumbing brass goods and from his long experience he is well qualified to write on this subject.



PETER W. BLAIR.

George R. Shreve announces that he has severed his connection with Shreve & Company, manufacturing jewelers and silversmiths of San Francisco, and is now associated with Treat & Eacret, jewelers and silversmiths of the same city.

W. H. Parry, superintendent of the National Meter Company, Brooklyn, N. Y., and a frequent contributor to the columns of THE METAL INDUSTRY, has recently contracted with the International Correspondence Schools of Scranton, Pa., to rewrite and revise their text books on Woodworking and Patternmaking.

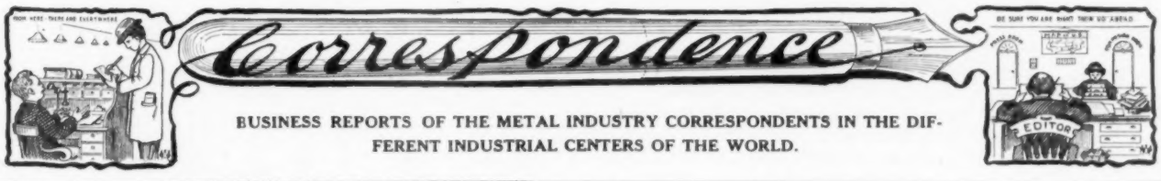
W. Thompson has resigned his position as foreman plater of the Buck Silver Company, Kill Buck, N. Y., and has become interested in the United Novelty Company, manufacturers of jewel boxes, also repairing and replating of all kinds, Newark, N. J.

James E. Pope, president of the New York Metal Exchange, has resigned and his resignation was accepted by the board of managers July 25. Vice-president A. B. Hall of the National Lead Company is now acting president of the Exchange.

E. C. Hegman, for many years assistant treasurer of The National Cash Register Company at Dayton, Ohio, and later secretary-treasurer The Courier Car Company, has joined the Gem City's leading metal finishing firm, The Dayton Plating & Manufcturing Company. Mr. Hegman will serve in the capacity of vice-president and treasurer. J. A. Keyes will continue as president. J. I. Pace as superintendent and Edw. Burket as secretary.

DEATHS

William A. Hardy, president of the William A. Hardy & Sons Company, brass founders, died suddenly July 4, of heart disease at his home in Fitchburg, Mass., at the age of 75. After finishing his schooling, Mr. Hardy was apprenticed to the brass foundry business in 1854 and seven years later took over the business of which he was president when he died. At that time the business was almost wholly confined to the local machinery trade, but when Mr. Hardy brought out a patented journal bearing orders began to flow in from railroads all over the country. In 1890 Mr. Hardy took two sons, Walter A. and Frank O., the present mayor of Fitchburg, into the business. In 1910 the company entered into an agreement for the manufacture of the Spring-Lockwood screen plate fasteners, a patented device for fastening screen plates without the use of screws, and a woodworking department was installed. The products of the company include castings of all metals, bearing metals, screen and suction plates. Mr. Hardy served in the Civil War and was a member of a number of organizations. He is survived by six sons, all of Fitchburg.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

AUGUST 5, 1912.

Throughout the Naugatuck valley the past six months have been "good" months for the various metal industries, and with present prospects this year seems destined to be called a busy year. Some of the plants in Waterbury have closed only for the holidays which are observed annually; some have been working nights since the first of the year, though not in all departments, and while others have had little or no overtime and have gone along without any increase in the number of hands since the midwinter shutdown, they have been busy and steady, and seem to have orders enough ahead to assure running full time most of the fall season.

There has been one serious upset during the past month, but that has been anticipated so long that it has had no serious effect on the local situation generally. It is the demand for a receiver from Gordon W. Burnham and other stockholders of the New England Watch Company. This occurred July 23, and the future of the company is still in the balance. As this is the home of the original "Waterbury Watch" there is considerable interest in the question among the people of the Naugatuck valley, and it is hoped that some way will be found to keep the plant running.

For three or four years those interested in the New England Watch Company have been aware of conditions which threatened trouble unless quickly eliminated. Their elimination has not been found easy, and the business has had its ups and down regularly in the interim. For months all would run smoothly and then a sudden discovery of a snag would throw all calculations

to the winds. Recently there have been high hopes for the recovery of its old prosperity by the company, as its new lever movement watch has been pronounced by watchmakers as a most promising timepiece, and one that was sure to win confidence and steady patronage. Lack of working capital has seemed to hinder its advancement, and lack of hands when orders for other goods came unexpectedly has delayed its introduction outside of the market near home. Some time over a year ago the company was lifted to high hopes after a dull period by extensive orders for a stop watch for which they were offered good terms. They took the order, and soon found the goods were wanted in larger numbers than they were then able to furnish them. The rush necessitated overtime and the hiring in of new hands, and the little boom made things look good. Finally the stock piled up faster than it sold and the inventor refused to take more. The company is supposed to have lost considerable on this deal. Recently its straits were so desperate that the management resorted to various schemes to get cash business, and made up watches on job orders to be sold under other names in some instances, but the business was so irregular that its reduced force was required only five days a week, and was granted a three weeks' vacation early this month.

It was hoped that some arrangement could be made by which enough working capital could be secured to enable the company to keep its skilled hands on the payroll and the shop running regular time, turning out a regular number of its good watches daily without regard for the outside market conditions for some time to come. It was understood that John P. Elton, of the American Brass Company, and Harris Whittemore, of Naugatuck, an officer of the United States Rubber Company, and numerous other Naugatuck valley corporations, were to put in upwards of a quarter of a million, with other stockholders, take charge of the policy of the company and help it to its feet. Creditors were consulted and agreements reached which would help the concern, once firmly on its feet and started on a sure path, to its old strength, but the negotiations struck a hitch over the question of future management, and the delay resulted in the demand for a receiver.

Many celebrities who have visited Waterbury on various occasions have received souvenir watches made by the company, and these have gone to as remote parts as the famous Waterbury watches which were made in this same plant when the world was clamoring for the pocket timepiece.

In the other industries of this section conditions have been normal. The new arrangement of the plants of the American Brass Company, by which all have become branches of the parent concern, has brought about several changes in the administrative departments which are meeting with favor, and on the whole the arrangement is highly satisfactory. In Torrington and Ansonia conditions have been favorable, and good business seems in store for both those communities for some time to come.

Continually growing, the Scovill Manufacturing Company continues to build new factories and additions, and while its operations in this direction are less extensive this summer than for some years, the masons and carpenters are not absent. The various departments of the great corporation are all enjoying lively business conditions, and the summer dullness is almost unknown here. Likewise the Chase Rolling Mills Company has found it hard to allow time off to hands in any department this season. In some branches it is working day and night crews, and it is running the full plant six full days, although many of the other factories have been following a five and a half day schedule since July 1. The Waterbury Manufacturing Company is busy, but is on a five and a half day schedule for the summer. At both the Waterbury and Thomaston plants of the Plume & Atwood Company business has been good since the first of the year, and the present season is prosperous for the company. The Steele & Johnson Manufacturing Company, the American Ring Company and the Waterbury Clock Company are enjoying similar conditions, although not exactly rushed. The Waterbury Farrel Foundry & Machine Company has been very busy the past four or five months, and sees a good fall ahead, with both domestic and foreign orders of good size.

The Baird Machine Company is getting "Bridgeportized" rapidly, and only the small novelty shop end of the business is any longer considered a part of industrial Waterbury. There are some, too, who regret that the industry was lost to the Brass City.

Politics are being widely discussed in all the shops here, but it is hard to analyze opinions satisfactorily. One of the Waterbury papers has been attempting a straw vote among the shop hands, and the results are odd. One shop supposedly solid republican returned a larger vote for Debs than any other candidate, and others showed the Wilson boom had taken good effect. Still Roosevelt has plenty of friends among the shop men, and returned a plurality from one plant, while in all the Taft strength proved weaker than anticipated. Some of the manufacturers here have taken a keen interest in the political situation, and while many who are personal friends of Mr. Taft are ardent defenders of his administration, the Roosevelt progressive party has some representatives in the inner circles.

At Waterville there is great activity at the new plant of the Chase Rolling Mills Company. Its great steel frame has been completed for several days, and during the past week the carpenters and masons have been rushing work on the exterior. All around the grounds a high fence has been erected, and the material is carried inside on a spur track. Work is being rushed on the private railway from this plant across Waterbury to the rolling mills, where two additions of 51 x 25 feet and 40 x 60 feet respectively will be erected. When the Waterville plant is completed it will be devoted to the manufacture of brass tubing, and this branch is to be made an important part of the company's business. The plant, when operated at its fullest capacity, will employ upwards of 2,500 hands..—F. B. F.

PROVIDENCE, R. I.

AUGUST 5, 1912.

Practically the vacation period for the closing of the manufacturing jewelry establishments in this vicinity is over and the manufacturers are settling down for the beginning of the fall and holiday seasons. In other lines of metal workers there is not the uniformity of vacation seasons as in the jewelry industry, but even with these a majority of the concerns have concluded vacations for this year. What the outcome of the next five months will be is uncertain. There has been a sentiment of labored optimism ever since the first of the year, but the business for the first six months aggregated well up with the average, and so the business men entered upon the last half of the year with the same hopefulness. The political mix-up in national affairs put some disquieting tone into the conditions, but still the manufacturers are trustful and anticipate sufficient business to round out a satisfactory year for a presidential quadrennial.

As an indication of the hopeful feeling existing in manufacturing business houses the recent semi-annual convention of the salesmen, managers, heads of departments and other officials of the Gorham Manufacturing Company at the plant of the corporation at Elmwood, this city, may be taken as a good one. Nearly 75 men from all sections of the United States, east of Chicago, were in attendance and all gave bright reports. The convention occupied two days, during which every phase of the market situation was discussed, together with prevailing styles and wants and different problems met with in individual localities. Business sessions of the representatives were held, which were presided over by John S. Holbrook, vice-president of the corporation. The social features of the gathering were particularly pleasant, including luncheons in the Casino at the company's plant, banquet at the Narrangansett Hotel and an outing at the grounds of the Warwick, with a Rhode Island clambake and field sports, formed a very enjoyable closing of a successful convention that was beneficial alike to every one attending.

At this convention it was stated that the Gorham Company had large numbers of orders on hand and that several of the departments were rushed. This is especially the case with the bronze foundry, where many large commissions are now being carried to completion. One of the largest metal pourings made in this State in some time was made recently at the bronze foundry, when the metal used in the bronze statue of former Chief Justice John Marshall, of the United States Supreme Court, which is to ornament the front of the new Federal Building at Cleveland, O., was poured. In all more than 5,000 pounds of metal was used in the figure.

Arthur M. Allen, Frederick W. Tillinghast and Hugo A. Clauson, all of this city, have become incorporated under the laws of Rhode Island as the American Jewelers' Finding Company, to be located at Central Falls, R. I., with a capital stock of $75,000. The concern, according to its charter, will engage in the manufacture, smelting, refining and otherwise dealing in jewelry of all kinds.

The first dividend, amounting to 16⅔ per cent., was declared recently in the bankruptcy case of the Union Manufacturing & Drop Forge Company, according to the records of Referee in Bankruptcy Chester W. Barrows. H. J. Aste & Company, of this city, report an unusually busy month in connection with the annual overhauling and renovation of manufacturing jewelry establishments. They have recently installed the following Boland machine for which they are sole agents: Pressure blower for Leach & Garner Company, Attleboro; blower and motor for MacPherson-Roubaud Company, this city; blower and sand blast for Heintz Art Metal Shop, Buffalo, N. Y.; blower for Smith Bros., this city, and large vacuum system for St. Anthony Church, this city. Edgar E. Craddock, manager of the Providence Art Metal Company of this city, was considerably shaken up and bruised on July 3 when an automobile in which he was riding was in collision with another machine. The Standard Machinery Company, 7 Beverly street, this city, has recently made an extensive shipment of machinery to William A. Rogers, Ltd., at Niagara Falls, N. Y.—W. H. M.

BRIDGEPORT, CONN.

AUGUST 5, 1912.

Business in this city appears to continue to be very good, and all the shops are running full time. Contrary to the usual custom very few shops will close down for any period this summer for repairs, cleaning, etc., work of this nature now being done Saturday afternoons and Sundays. The American Graphophone Company has found it necessary to put on a night shift to take care of their increasing orders. Some factories are having difficulty to secure laborers for unskilled laboring work, due probably to the fact that during the summer months many workmen leave the factories for outside work.

At the hearings before Chairman Prouty of the Interstate Commerce Commission, held in Boston, July 1, 2 and 3, into the service, regulations, practices, etc., of carriers in New England, the local Manufacturers' Association was represented by its traffic manager, with the object in view of securing for Bridgeport better transportation facilities, particularly on shipments destined to Northern New England territory.

It is reported that the Fritchie Electric Vehicle Company, whose principal plant is located in Denver, Col., is considering the erection of a branch factory in this city to take care of its eastern business. It is said to be the plan of the company to secure temporary quarters at once, pending the securing of a site satisfactory for the construction of a plant.

A permanent exhibition of factory safety devices is being placed in the offices of the local Manufacturers' Association for the benefit of its members, and it is planned to keep the exhibition up to date, and to show all the latest devices for the protection of workmen. It is the hope of the officers of the association that through this method manufacturers will become interested in this suject and apply to their plants such of the devices as may be practical. Many large corporations in the country who are actively engaged in putting into their plants safety devices, have assisted the local association by sending photographs, blue prints, charts, etc., for this exhibit.

The contract for the new factory of the Birdsey-Somers Company has been awarded to the Shelby Company, of New York. The structure will be built at Summerfield and Barnum avenues, and will be of concrete, four stories high.

The seventeenth annual convention of the Connecticut State Association of the National Association of Stationary Engineers, recently held in this city, was a very successful one, and much interest in it was shown by manufacturers of power plant specialties and engineers' supplies. An address was delivered by Mr. F. J. Mulcahy, vice-president of the Crane Valve Company, and the delegates afterwards visited the extensive plant of this company.

Work on the addition to the plant of the Locomobile Company is progressing rapidly. This addition will be used for the building of automobile trucks, which the company intend to manufacture on a large scale. Plans are either being considered, or work has already commenced on a number of other additions for manufacturing concerns in this city.—F. A. B.

ROCHESTER, N. Y.

AUGUST 5, 1912.

Rochester is one of the large manufacturing cities of New York State. Its varied line of industries are on the increase. Metal working industries of all kinds are numerous, and the products find their way through all the States. Having ample power facilities from the Genesee Falls, and brought here from Niagara Falls, there is no lack of what is needed in this line.

The Rochester Brass and Aluminum Company, of 77 North Water street, have plenty of work of hand, and some Government work in making range finders. They make a specialty of ornamental castings, and will soon manufacture their own brass goods, such as automobile pumps, etc. The foundry is too small, and later in the year they will build a new plant, to cost $20,000. They make mixers for special purposes up to 100,000 pounds to the square inch. This firm is practically a new one, having started in business a year ago, and work with them has been so heavy that an increase in the plant was necessary. A lot of new machinery will be required. Joseph Strauss has charge of the manufacturing, and Edward Warren, charge of the foundry.

Henry Toothill, of 119 North Water street, plating plant, is figuring on going into the line of manufacturing automobile specialties. Henry Toothill started in the plating business as Toothill & Company twenty-five years ago. He does mostly silver plating, some gold work. It was Mr. Toothill, who in 1900 gold plated a plow for the Syracuse Chilled Plow Company, which was exhibited at the World's Fair in Chicago. The Acme Plating and Specialty Manufacturing Company, general platers at 77 North Water street, expect to make a new line of goods, and if they do, will considerably enlarge the plant. The general platers here have noticed their business getting smaller every year, owing to the large factories having put in their own plating plants. This has become so much the rule now that there are few large plants that are not so equipped.

The Rochester Brass and Wire Company were incorporated, with a capital of $100,000, by George E. Von Laer, George R. Helmer and Richard L. Saunders.

The Rochester Stamping Company, of 46 Jones street, manufacture hollow ware and are building a four-story enlargement to the plant, 60 x 107 feet in size.

E. H. Tichenor and Company, of Binghamton, N. Y., making staples, nails and tacks, are building an addition to their factory. Atkinson and Company made a large bronze casting weighing 3,600 pounds, in the shape of a pump to take the place of an iron one, which had been destroyed by the corrosion of acid in the salty water. It is for the use of New York City.

Clum and Atkinson dissolved partnership at 575 Lyell avenue. Mr. Clum went to Lockport, N. Y., starting in the foundry line, making automobile castings. The Atkinson Company continued at the above address.

Henry Wray and Son, 193 Mill street, brass casting and doing manufacturing, are busy.

Charles Paxson and Company, who conducted the Rochester Plating and Specialty Machine Company, at 299 State street, failed and went out of business. Mr. Paxson went to Warsaw, N. Y. Bertram Moll, of 104 East Main street, manufacturing jewelry, has remodeled his shop for making badges and rings, put in new fixtures and machinery, and has been quite busy. G. H. Humbert, manufacturing jewelry, has moved from 312 to 303 Cornwall building, having now a larger shop. He has added gold and silver plating, and is putting in polishing and other machinery. The Ryede Specialty Works, of 177 West Main

street, making vending machines of steel, brass and German silver, are going into the manufacturing of a vending machine for general merchandising, which will automatically sell you goods, costing from one cent to fifty cents. A plating plant will be installed. Quite a number of specialties and novelties are also made.

The Gay Manufacturing Company, of 177 West Main street, was started by Edgar A. Gay, who died a short time ago, at the age of 63 years, and he built this business up. Metal specialties are made, mainly for the furniture trade, and they have their own plating plant. Considerable new machinery has been added, and more will be put in, making the plant thoroughly up to date and better able to take care of the growing business. Azel Gay is now the general manager.—H. S.

ROME, N. Y.

AUGUST 5, 1912.

Business for July was quite brisk, although not much more than normal. The brass and copper industries have trouble getting enough help. The daily papers are used quite frequently advertising for men. This shortage of help is due mainly to the fact that the extensive improvements going on here take large numbers of men from the factories. The work is mostly outside and, as a rule, pretty good wages are paid ordinary help. The local canning factories always take their quota of help from the factories and this, combined with the extra drain, have made the brass and copper companies suffer more than in previous years.

Rome has always suffered from poor transportation facilities, and this has been one of its drawbacks since its birth. It is one of the oldest cities in central New York, but some of the younger cities have sprung ahead in point of population. But what Romans do is always done well and stands the test of time. Now two new important railway connections are to be built. One a steam railroad connecting Rome and Osceola and intermediate points. This is already under construction and will be a great boon to the surrounding small towns. The other line is an electric line joining Rome and Oneida. There has always been a good feeling existing between these two places. In fact, they are really twin sisters. When Rome wants help she always sends to Oneida and vice versa. When completed Rome will have a very good trolley service with nearby cities. It will then be possible to go from Rome to Syracuse, as the line now connecting Utica and Syracuse goes through Oneida, but does not pass through Rome. The question of a trolley to Oneida has long been considered, but it looks now as if it is going to be an actual line instead of merely on paper.

A recent report of the local postmaster shows an enormous amount of work done. The business of Uncle Sam has increased over 100 per cent. in the past fifteen years. One question which now confronts Rome is adequate places to house its rapidly increasing population. What is needed is a large number of houses renting for a moderate sum which will enable the average workingman to live in. Rome is considering the placing of its lights on posts instead of the old style now used. It is not decided as yet whether the flaming arm or the incandescent lights will be used. The several different styles will be exhibited and tried out before anything definite is done. The Chamber of Commerce is now working with the Romohawks in getting the fourth annual carnival under way, which will be held the first week in September.

The Rome Manufacturing Company held their annual salesmen's convention July 23, 24 and 25, and nearly all of its representatives were present. Their men cover all parts of the country and these very instructive conventions are a great help to the men in disposing of the company's large output of brass and copper goods.

The Union Can Company are erecting a large warehouse at their plant in West Rome. They supply nearly all of the cans to canning factories here and in nearby towns. They have an output of 300,000 cans per day. Mr. Ayers, the manager, hopes to increase this considerably in the near future.

The Rome Brass & Copper Company have felt the shortage of help very keenly for the past month. They have a large number of orders on their books, but the continued high price of copper has curtailed orders somewhat. The Rome Metallic Bedstead Company also report a shortage of help, but this is usually their dull season. This year, however they have had more business at this time than in past years. They have the best system for the disposing of their beds, etc., than any of the other large manufacturers of this class of goods. They have storehouses or branches in all of the principal cities in the East and Middle West.

The Rome Wire Company still are obliged to run a night force in order to keep up with their orders. They, too, have difficulty in securing help to run their factory to its capacity. The Stevens Manufacturing Company, which has made only carbureters for automobiles in the past, intend manufacturing other articles of brass and copper as soon as the necessary machines can be installed.—H. M. G.

DETROIT, MICH.

DETROIT, August 5, 1912.

The improved transportation facilities that are being installed in Detroit are appreciated in every line of the brass and aluminum industry. Conditions were alarming until the first of the year, but since that time the railroads have got busy and now the outlook is bright in every way for ample facilities for handling the great quantities of products shipped from this city. The board of commerce has been particularly active, and it is largely through this body that the trouble is being eliminated. The same conditions prevailed at the close of July as the month previous, and, in fact, for the last three or four months. Business is good all along the line, is the report from all manufacturers. There is not the least prospect of a slow-down in business, and, in fact, the future never was so bright for Detroit as it is today.

The presidential election is having no effect on conditions, even though there is so much doubt as to which party will be successful at the polls this fall. The automobile factories are keeping up their record for output, all the older established concerns even going beyond the limit they had set for the year. The Ford company will complete before the end of the year 75,000 cars, the greatest in the history of any one plant. The Chalmers, the Cadillac and the Packard are all working full-handed and forced in some instances to maintain night crews. Manufacturers of brass and aluminum goods are constantly advertising for more help, all of which is a good sign of the times. The demand for plumbers' and other supplies in brass and aluminum remains normal for this season, although a falling off is expected later in the year.

The Triumph Manufacturing Company, which was organized last April for the manufacture of the Triumph motorcycle, have made record progress in the establishment of an entirely new plant, installation of machinery, tools and supplies and the perfection of factory organization. The plant has been working day and night for the past month in order to get their product on the market. The up-to-date nickel plating and polishing plants of this concern were installed by Frederic B. Stevens, the well known manufacturer of and dealer in polishers' and platers' supplies, of this city. The officers of the Triumph company are: President, Robert M. Brownson; vice-president, C. C. Wormer; secretary, Muir B. Duffield; treasurer, George W. Sherman.

At the meeting of the Michigan Retail Jewelry Dealers' Association, held here the latter part of the month, Hugh Connolly, of Detroit, was re-elected president. Other officers chosen are: Vice-president, Andrew Toepel, Detroit; second vice-president, Max Jennings, St. Clair; treasurer, James Garlick, Detroit; secretary, F. O. Davenport, Bay City. Saginaw probably will be chosen for the next meeting place, although this is left with a committee. President Connolly announces that he will name the first and second vice-presidents, the secretary and himself as delegates to the annual convention of the National Jewelers' Association, to be held in Kansas City, August 6 and 9. At the Detroit meeting the jewelers advocated laws to do away with the fraudulent traders and to compel the correct stamping of jewelry at all times. A committee was appointed to present this matter to the Michigan state legislature.—F. J. H.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

ADDITIONAL TRADE NEWS WILL BE FOUND UNDER "CORRESPONDENCE."

William A. Hardy & Sons Company, Fitchburg, Mass., will erect a brick addition to their brass foundry.

It is reported that a new brass factory has been started at North Paterson, N. J., for the manufacture of auto parts.

The Michigan Copper & Brass Company, Detroit, Mich., have declared their regular semi-annual dividend of 3 per cent., payable July 15.

It is stated that 460 miles of copper wire will be used for making the necessary telephone connections in the new Woolworth Building, New York.

It is reported that the National Lead Company have purchased the plant of the Matheson Lead Company, Dayton, Ohio, in order to increase their manufacturing capacity.

It is reported that the Shuttleworth Brothers Brass Company, of Amsterdam, N. Y., are erecting a two-story addition to their mill, 150 by 28 feet, and an office building 50 by 40 feet.

Wm. A. Rogers, Limited, manufacturers of silverware and cutlery, Niagara Falls, N. Y., are preparing plans for some additions to their factory buildings for manufacturing purposes.

The current trade press reports that the Northern Aluminum Company, Shawinigan Falls, Quebec, Can., have taken out a permit for a $50,000 brick, steel and galvanized iron building.

The current trade press reports that The Torrington Manufacturing Company, manufacturers of machinery, Torrington, Conn., will erect a one-story addition, 102 by 338 feet, to its plant.

The Bristol Brass Company, Bristol, Conn., manufacturers of sheet, rod, wire and brazed tubing in brass, bronze and German silver, have now in process of construction an addition to their rolling mill.

It is reported that the Aluminum Ore Company, Pittsburgh, Pa., are about to double the capacity of their plant at East St Louis, Ill. This with the equipment will necessitate an expenditure of about $300,000.

The Cleveland Bronze Company, Cleveland, Ohio, expect to shortly move into their new four-story plant, 40 by 140 feet, which is now nearing completion. It is stated that brass and foundry working tools will be ordered.

The Standard Sheet Metal Company, formerly of Passaic, N. J., have started a factory at N. Paterson, N. J., for the manufacture of grease guns, double cylinder auto pumps and other brass novelties. The factory is 185 by 25 feet.

The Wolf Brothers Foundry Company, which was recently organized at Joliet, Ill., to manufacture aluminum, brass and other metal pattern work, has opened a factory at 1803 Cass street. Max Wolf, formerly foreman for the Pratt Manufacturing Company, will be at the head of the new concern.

The Davis & Furber Machine Company, of North Andover, Mass., are about to start operations in their new core-baking and brass smelting departments. They are installing melting furnaces and reel type core ovens made by Rockwell Furnace Company, New York.

The Northern Blower Company, 4515 Storer avenue, Cleveland, Ohio, M. A. Eiben, manager, is a new concern which is engaged in the manufacture of dust collectors for grinding, polishing and buffing wheels, also tumbling mills. They are also sales agents for high and slow speed exhaust and blast fans.

The American Manganese Bronze Company, 99 John street, New York, are making additions to their plant at Holmesburg, Philadelphia, Pa., that will double their foundry floor space. Contracts have been placed for additional electric traveling cranes and other equipment. This will give the company better facilities than ever for handling either large or small work.

The MacKay Copper Process Company, Norwich, Conn., report, through Henry S. MacKay, that they are constructing a testing plant for the treatment of copper ores to show what can be done with the new electro-chemical process of this company for the extraction of copper from ores. The plant will have a capacity of thirty tons at a charge.

The Parish Manufacturing Company, of Reading, Pa., manufacturers of heat treated automobile frames, have just contracted with the Rockwell Furnace Company, 26 Cortlandt street, New York, for another of their Overfired Car Type Accurate Temperature Heat Treating Furnaces. This is the fourth "Rockwell" furnace this company has installed.

The American Brass Company, Waterbury, Conn., have purchased woodland in Ludlow and Bolton, Vt., where they have formed a company to cut lumber to make box boards, etc. According to the Secretary of State of Vermont the capital stock of the company is $500,000, but no Vermont office is established. George W. Wing, of Montpelier, is named as one upon whom papers may be served.

The August issue of "The Merry Moulder," a house organ published by the Osborn Manufacturing Company, manufacturers of molding machines and platers and polishers' supplies, Cleveland, Ohio, will be called the "Automobile Number." It will be largely devoted to illustrations and descriptive matter showing the extent to which molding machines are being used in foundries turning out cylinders, pistons, piston-rings, crankcases, housings and other important castings for motor cars.

The Rockwell Furnace Company, 26 Cortlandt street, New York, announce the following installations of their large overfired, accurate temperature, heat treating furnaces: One for the New Process Steel Corporation, Lancaster, Pa., to be used for annealing steel wire, bars, etc.; three for the Crucible Steel Company of America, Pittsburgh, Pa., to be used for the heat treatment of special steels (natural gas to be the fuel); and for the Castle Lamp Company, of Amesbury, Mass., for their plant now building at Battle Creek, Mich.

The Lycoming Foundry & Machine Company, manufacturers of iron, brass and aluminum castings, automobile motors and special machinery, Williamsport, Pa., report, through W. H. Shirley, purchasing agent, that they are erecting a 50 by 160-foot addition to their plant, to be equipped for the manufacture of aluminum and brass castings for automobile motors, with a capacity of thirty to forty motors per day. This addition will employ about seventy-five men, increasing the total number of employees of this company to nearly four hundred.

There will be sold at the U. S. Naval Training Station, Newport, R. I., material belonging to the Navy, condemned as unfit for use therein, consisting of scrap metal, scrap brass, empty brass cartridge cases. The sale will be for cash to the highest bidder by sealed proposals to be opened at 11 a. m., Tuesday, August 20, 1912. Schedules containing form of proposals and terms of sale can be obtained upon application to the Paymaster, Naval Training Station, Newport, R. I. Beekman Winthrop, Assistant Secretary of the Navy.

The Vulcan Engineering Sales Company, of Chicago, Ill., announce that it has taken the selling agency for the line of structural and plate working machinery, punches, shears, rolls, bulldozers, etc., manufactured by the Rock River Machine Company, of Janesville, Wis. This is in addition to the lines now controlled by the Vulcan Engineering Sales Company, which include the product of the Hanna Molding Machine Works, making pneumatic riveters, Mumford Molding Machine Company's molding machines and foundry equipment, Q. M. S. Company's metal sawing machinery and shop equipment. The Vulcan Engineering Sales Company make a specialty of machinery for structural and boiler shops and foundries.

Owing to friction which developed between smelters, jewelers and metal dealers every year over the division of the recovered gold when the large melting crucible has been destroyed, the United States Assay Office of New York has decided to install individual crucibles for each customer. It is also planned to install vaults in the new Assay Office for gold and silver, which will be larger than those in the Treasury Building in Washington. The vaults will be five stories in height, four of them being below the street level. Every modern device for the protection of the enormous treasure which will be contained in these vaults will be installed. It is estimated that sufficient gold bullion can be stored in the new vaults to represent all the outstanding gold certificates that will be required in this country for fifty years.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., August 20, and publicity opened immediately thereafter to furnish at the Navy Yard, Brooklyn, N. Y., a quantity of naval supplies as follows: Sch. 4727, brass speaking trumpets; Sch. 4733, brass nuts, brass nickel-plated spittoons; Sch. 4734, lead pipe, plumbers' wiping solder; Sch. 4736, sheet copper. At the Navy Yard, Philadelphia, Pa., Sch. 4736, brass naval rod, brass pipe and copper tubing. At the Navy Yard, Washington, D. C., Sch. 4730, zinc ingot, Bertha or Horsehead; refined copper ingot Applications for proposals should designate the schedules desired by number. Blank proposals will be furnished upon application to the navy pay office nearest each yard, or to the bureau.

T. J. Cowie, Paymaster-General, U. S. N.

FIRES

Fire in the plant of the F. H. Lovell Manufacturing Company, manufacturers of brass naval fittings, Arlington, N. J., on July 2 caused a loss of about $75,000. It is stated that a large order of goods for Argentina and China, which was to be shipped on the following day, was destroyed.

CHANGE IN FIRM

The Franklin Brass Company, Battle Creek, Mich., has succeeded to the business of the Franklin Iron & Metal Company of that city.

The Murdock-Reed Company, Boston, Mass., have succeeded the Murdock-Shaw Company, manufacturers of bronze tablets and name plates. They are also manufacturers of tile and fireplace work of every description.

The Cleveland Brass Manufacturing Company, which was recently incorporated with a capital stock of $150,000, will succeed the Cleveland Brass & Bronze Company, manufacturers of plumbers' brass goods and brass specialties. The company are erecting a brick and steel addition to their plant, 40 by 120 feet, four stories.

The Bay State Brass Company, of Haydenville, Mass., and New York, after a competitive life of five years, passed into the control of the Haydenville Company, manufacturers of brass and iron goods for water, steam and gas, who will continue the plant under separate management. The plant employs about seventy-five men.

The International Nickel Company, New York, have made a tentative agreement for consolidation with the Colonial Nickel Company. The consolidated company, according to the agreement will be known as the International Nickel Company, and will have an authorized capital stock of $62,000,000. The present International Company has a capital of $28,000,000, and that of the Colonial company is $9,000,000. A special meeting of the shareholders has been called for September 5, for the purpose of ratifying the merger.

It is reported in the current press that The Davenport Machine and Foundry Company have purchased the business, patents and stock on hand of the Killings Molding Machine Works of Davenport, Iowa, and will continue to place these machines on the market. As soon as all work now on hand has been completed the plant of the Killing Company will be disposed of. It is said that Mr. Killing, who has been sole owner of the Molding Machine Company, will return to Germany in the fall to take chage of a plant manufacturing railroad cars.

BUSINESS TROUBLES

A hearing will be had upon the case of the bankruptcy of the Consolidated Casting Company, Mechanicsville, N. Y., before the U. S. District Court for the Northern District of New York, on September 3, at Norwich, at 10 a. m.

Stanley Doggett and Frank A. Terry, complainants against the Western Foundry Supply Company, New York, report that on July 16, the receivers for the Western company presented to the U. S. District Court for the Southern District of New York, their final report, which states that all the collectible accounts due to the defendant company from debtors resident in New York, have been collected by the receivers appointed by the U. S. Circuit Court for the District of New Jersey, and that there is now no balance remaining in the hands of said receivers.

INCREASE OF CAPITAL STOCK

The Standard Brass Works, Detroit, Mich., have increased their capital stock from $30,000 to $75,000, and will erect a new plant as stated in the July issue of The Metal Industry.

The Maiwurm Aluminum Works, manufacturers of aluminum kitchen utensils, Erie, Pa., has increased its capital stock from $10,000 to $25,000. The foundry of this company melts about 2,000 pounds of metal per day.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

The Chromo Silver Bronze Company, Illinois. Capital, $10,000. To manufacture metals and alloys. Incorporators: H. H. Hay, H. Fitzgerald and E. C. Koskoba, all of Chicago.

The Aluminum Novelty Company, New York. Capital stock $1,000. To manufacture aluminum novelties, etc. Incorporators: P. Bernstein, R. Polcini and Ada Bernstein, all of New York.

The Vendome Brass and Copper Works, Louisville, Ky., Capital, $10,000. Incorporators: Elmore Sherman, C. J. Thoben and L. E. Sherman, all of Louisville.

The Reynolds Aluminum Company, New Washington, Ohio. Capital stock, $10,000. Incorporators: F. W. Reynolds, J. A. Jacobs, Edward Geissman, H. M. Kibler and J. H. Donaldson.

The Frontier Brass Foundry, Inc., Niagara Falls, N. Y. Capital, $25,000. To carry on a brass foundry business. Incorporators: John Lebherz, Robert Phipps and George W. Knox, all of Niagara Falls.

The Wisconsin Aluminum Foundry Company, Manitowoc, Wis. Capital, $3,500. To carry on an aluminum foundry business. Incorporators: Henry Stahl, Bruno Dallwig and Abraham Schwartz, all of Manitowoc.

THE FORBES BRASS COMPANY, Rochester, N. Y. Capital, $10,000. To manufacture a line of plumbing supplies. This company succeeds the Sterling Brass Works. Officers: Alvin F. Stahl, president; F. W. Reidenbach, vice-president; Geo. R. Coates, treasurer; E. J. Forbes, secretary.

THE TIN DECORATING COMPANY, Baltimore, Md. Capital stock, $2,000,000. To carry on a business of rolling, tinning, galvanizing, enameling, coating, plating and decorating all kinds of metals. Incorporators: D. H. Haynes, V. E. Hansen and C. G. Goldsborough, of Jersey City, N. J. This company have taken over the tin department of the American Tobacco Company located in this city. While it is intended, as in the past, to manufacture tin boxes, signs and decorated metal for the large tobacco companies, it is also the intention of the new organization to solicit general trade in their line.

PRINTED MATTER

Tumbling Barrels: The S. G. Arnold Company of Chicago, Ill., issue a catalog giving descriptions of their steel factory equipment, machinists' and tool makers' benches, sectional shelving and bins, and tumbling barrels. Copies of the catalog will be sent upon request.

Turbines: The De Laval Steam Turbine Company, Trenton, N. J., have issued a new 116-page catalog descriptive of the products of this company. These include De Laval centrifugal pumps, single-stage turbines and centrifugal blowers, built in both single and multi-stage types. Copies upon request.

Graphite Products: The Joseph Dixon Crucible Company, Jersey City, N. J., give a complete description of their various graphite products in a small booklet just issued. These products constitute specially prepared graphite for lubricating purposes as well as the manufacture of crucibles, pencils and a full line of greases, belt dressings, paints, etc.

Wheel Presses: The Watson-Stillman Company, New York, have just issued Catalog No. 85 illustrating three types of Hydro-Pneumatic Wheel Presses and listing and describing over seventy variations in type and size of from 60 to 600 tons capacity. The hydro-pneumatic feature in wheel presses is exclusive with this company. A copy will be sent to anyone interested.

Fuel Economizers: The Green Fuel Economizer Company, Matteawan, N. Y., have issued a very handsome 100-page catalog in the interests of their fuel economizers. The book is fully illustrated with half-tones and outline drawings, showing installations in all kinds of industries of their well-known economizers. Copies of the publication may be obtained upon request.

Precision Balances: A little booklet entitled "The Use, Care of Precision Balances" is published by Voland & Sons, makers of balances and weights, New Rochelle, N. Y. This little book gives very valuable information regarding the handling of fine balances and should be in the hands of everyone who is interested in precision balances. Copies will be mailed free upon request.

Refining Lead: The National Lead Company, New York, have issued a pamphlet giving some very interesting information regarding the use of refined lead as a means for hardening or tempering steel. It is claimed that this refined lead is the most suitable lead, to be used for hardening, now on the market and shows, upon analysis, total impurities of .0053 per cent.

Nickel Anodes: Henry S. Wyckoff, 78 Barclay street, New York, is sending out a card in the interest of the "Ely" pure nickel anode. This anode is made of Canadian grain nickel and is guaranteed 90 to 93 per cent. pure, and is manufactured in all shapes with patent hooks. Mr. Wyckoff is also the New York selling agent for the buffs and polishing wheels manufactured by Divine Brothers of Utica. N. Y.

Vanadium Steel: A booklet has been published by the United Steel Company, Canton, Ohio, which is unusually interesting to all manufacturers who are interested in the development of vanadium steel. The book contains valuable information regarding the new steel and has cuts showing clearly the result of different tests on springs, gears, axles, bars, etc. Copies may be obtained on application.

Silver Deposit: The Archibald-Klement Company, Newark, N. J., are sending out a card depicting an electrical storm at night. They say "you may not be particularly interested in lightning, but you are in sterling silver and silver deposit that sells. Goods that will 'strike' your customers favorably in a 'flash'; that do not need any 'thunder' to make them move." Further particulars may be obtained by writing to the above company.

Metal Lumber: The Berger Manufacturing Company, Canton, Ohio, have recently issued a very elaborate and extensive treatise on metal lumber, a substitute for wood. The pages of the text book are filled with the most valuable information and include drawings and sectional views, showing application, installation and erection of different types of buildings of this material. Copies of the book can be secured by writing direct to the general offices of the above company.

A Model Erection Shop: Is the title of a very artistic 16-page booklet just issued by Lockwood, Greene & Company, architects and engineers for industrial plants, 93 Federal street, Boston, Mass. It describes with illustrations, the construction of a one-story, reinforced concrete machine shop which is well lighted, and at the same time has its floor area covered by an abundance of cranes running on concrete girders. The booklet will be sent on request.

Architects Bronze: The Pittsburgh Architects Bronze Company, Pittsburgh, Pa., have issued a pamphlet giving fine illustrations and descriptions of architects bronze, which is an ornamental, seamless and indestructible metal fire-stop. This material is cast by electricity to any desired degree of thickness, without seams or laminations, on prepared surfaces of wood, plaster or glass and at less expense than the product of the coppersmith or bronze worker. Pamphlet and price list sent upon application.

Plumbers' Supplies: The Bridgeport Brass Company, Bridgeport, Conn., have issued a thirty-page booklet giving full descriptions and illustrations of the extensive line of plumbers' supplies manufactured by them under the name of "Bridgeport." These supplies are made of seamless brass nickel plated tubing and constitute various styles of traps, downtank bends, offset bath and basin supplies, floor flanges and reducer and slip joint couplings. Copies of the booklet may be had upon request.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

ADNEWS

Some advantages in using Trisalyt, the metallic triple salt for electroplating brass, copper, bronze, zinc, gold and silver, are set forth in the advertisement of the Roessler & Hasslacher Chemical Company, 100 William street, New York.

The Bacon Felt Company, Winchester, Mass., call attention this month to their felt polishing wheels and felt specialties. They furnish all grades for mechanical purposes, making a specialty of yard squares from ¼ inch to 3 inches in thickness.

Leiman Brothers, 62-J John street, New York, manufacturers of sand blasts and positive high pressure blowers and vacuum pumps, illustrated and described in their products in the advertising pages. This concern furnishes various specialties, a large line of standard appliances and equipment, and dust-collecting systems for manufacturing jewelers and metal shops.

METAL MARKET REVIEW

NEW YORK, August 5, 1912.

COPPER.

At the time of our last report on copper, July 8, the London market had declined about £8 per ton from the highest, our market was more or less weak and very much unsettled. The producers were all pretty well sold up for July and August, and with no business in sight and practically no copper for sale the leading selling agents stood pat at 17¾ for Lake, 5/8 for Electro and 17½ for Casting. What little demand developed during the month was taken care of by dealers and considerable second-hand copper came on the market at from 17½ cents for Lake to as low as 17 cents.

When London got over its scare and began to advance, prices here worked up again and during the week from July 22, when the London price had advanced to within about £1 of the highest point in June, consumers came into the market for August, September and October delivery, second-hand lots had been cleaned up mostly at the lower prices, and consumers have had to pay pretty close to the highest figures the producers were asking.

The break in London was probably started by a New York interest who was heavily short in this market, the story of concealed stocks, etc., worked all right and the movement was undoubtedly successful.

Statistically the market is in good shape, the foreign stocks showed an increase for the month of over 3,000 tons, trade here in America is remarkably good and the demand for the balance of the year seems to be on a sound basis.

Market closes, Lake 17½, Electro 17½, Casting 17¼ cents.

TIN.

The tin market during the month has been more or less irregular on account of the strike in London and the fact that nearly all the shipments had to come through foreign ports and all the delayed June shipments have been coming along so that arrivals during the month of July have been very heavy—over 5,000 tons—while the consumption has been very good at about 5,000 tons.

Spot tin is quotable at around 45 cents, with August and September obtainable at 44.85 cents.

LEAD.

The lead market has been dull and there has been enough "independent lead" during the whole month to undersell the late advance by the trust made early in July to 4¾ cents, New York. One-quarter cent per pound advance on top of an advance of 30 points all within a month is rather more than the lead market can stand. Market closes today 4.70 carloads, New York, and 4.55 East St. Louis.

SPELTER.

The spelter market has been very firm and prices have been boosted along apparently way ahead of the actual selling prices made to consumers. The scarcity of ores and the record high price being now paid for ores, of course, are all in favor of higher spelter, but the price is very close to the foreign quality, and this may help to check any further advance, unless London also advances. Market closes lower.

Carload lots, New York, 7.15-7-20c. and 6.90 to 7.00c., East St. Louis.

ALUMINUM.

The foreign market is very much firmer at 23½ to 24 cents, while the domestic price is held at 22 to 22½ cents.

ANTIMONY.

The market has been quite active on foreign advances and prices here are about ½ cent per pound higher. Cookson's is quoted at 8½ cents, Hallett's 8 cents and Chinese and Hungarian brands at 7¾ cents.

SILVER.

The silver market has been dull and uninteresting and prices are not much changed. Closing, New York, 60 cents; London, 27½d.

QUICKSILVER.

The market has been rather firmer, with wholesale price $42.50 against $40.50 a month ago. Jobbing lots, $43 per flask to $43.50.

SHEET METAL.

There has been no change in sheet copper at 22 cents base, with high sheet brass lower at 17c. base, copper high, wire at 19 to 19¼ cents base.

OLD METALS.

The old metal market has picked up again with the advance in London standard, but prices are not as high as a month ago before the break in London. The fluctuation in prices and the subsequent advance has helped the market towards the close of the month.—J. J. A.

JULY MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	17.50	17.15	17.40
Electrolytic	17.50	17.00	17.35
Casting	17.25	16.75	17.00
TIN	47.00	43.30	44.75
LEAD	4.75	4.50	4.70
SPELTER	7.25	7.15	7.22
ANTIMONY (Hallett's)	7.90	7.75	7.80
SILVER	61¼	60.00	60.66

WATERYBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.:

1911—Average for year 12¾. 1912—January, 14½; February, 14½; March, 15; April, 16; May, 16⅜; June, 17½; July, 17¾ cents.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INFORMATION BUREAU

Any firm intending to buy metals, machinery or supplies, and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY, 99 John street, New York. Commercial questions are answered by return mail. Our Information Bureau is for the purpose of answering questions of all kinds.

Metal Prices, August 5, 1912

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lbs.	
Lake, carload lots	17.60
Electrolytic, carload lots	17.60
Casting, carload lots	17.50
TIN—Duty Free.	
Straits of Malacca, carload lots	45.00
LEAD—Duty Pig, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.70
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western, carload lots	7.20
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	26.00
100 lb. lots	24.00
Ton lots	22.00
ANTIMONY—Duty 1½c. per lb.	
Cookson's cask lots, nominal	8.50
Hallett's cask lots	7.85
Chinese	7.75
Hungarian grade	7.75
NICKEL—Duty Ingot, 6c. per lb. Sheet, strip and wire 35 per cent. ad valorem.	
Shot, Plaquettes, Ingots, Blocks according to quantity	40 to .45
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL—Duty 20 per cent	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25 per cent. ad valorem (100 lb. lots)	1.50
BISMUTH—Duty free	2.00
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty 25 per cent. ad val.	.98
QUICKSILVER—Duty 7c. per lb.	.60
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	45.50
SILVER—Duty free	.60

OLD METALS.

Dealers' Buying Prices. Cents. per lb.		Dealers' Selling Prices. Cents per lb.
14.75 to 15.00	Heavy Cut Copper	16.00 to 16.25
14.25 to 14.50	Copper Wire	15.75 to 16.00
13.00 to 13.25	Light Copper	14.00 to 14.25
11.75 to 12.00	Heavy Mach. Comp.	12.75 to 13.00
9.00 to 9.25	Heavy Brass	10.00 to 10.25
7.25 to 7.50	Light Brass	8.25 to 8.50
9.00 to 9.25	No. 1 Yellow Brass Turnings	9.75 to 10.00
10.50 to 11.00	No. 1 Comp. Turnings	11.50 to 12.00
4.00 to ——	Heavy Lead	—— to 4.25
4.75 to ——	Zinc Scrap	—— to 5.25
6.00 to 6.50	Scrap Aluminum, turnings	7.00 to 9.00
10.00 to 12.00	Scrap Aluminum, cast, alloyed	10.00 to -3.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 17.50
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

INGOT METALS.

		Price per lb. Cents.
Silicon Copper, 10%	according to quantity	27 to 32
Silicon Copper, 20%	" "	30 to 32
Silicon Copper, 30% guaranteed	" "	32 to 34
Phosphor Copper, guaranteed 10%	" "	25 to 28
Phosphor Copper, guaranteed 15%	" "	27 to 30
Manganese Copper, 25%	" "	27 to 30
Phosphor Tin, guaranteed 5%	" "	58 to 61
Phosphor Tin, no guarantee	" "	51 to 53
Brass Ingot, Yellow	" "	12½ to 12⅞
Brass Ingot, Red	" "	13 to 15
Bronze Ingot	" "	15 to 15⅜
Manganese Bronze	" "	19½ to 21
Phosphor Bronze	" "	13 to 16
Casting Aluminum Alloys	" "	19¾ to 24¼

PHOSPHORUS—Duty 18c. per lb.
According to quantity ..... 30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 22 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over ..... Base Price.
(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

ZINC—Duty, sheet, 1¼c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill	8.75 less 8%
Casks, jobbers' prices	9¼
Open casks, jobbers' prices	9¾

Metal Prices, August 5, 1912

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect August 1, 1912, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.17	$0.18⅞	$0.20¾
Wire	.16¾	.18⅞	.20¾
Rod	.16¾	.19⅝	.21¾
Brazed tubing	.21⅝	——	.25½
Open seam tubing	.20½	——	.23½
Angles and channels, plain	.20⅞	——	.24

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.18¼	$0.20½	$0.22
Wire	.18	.20½	.22
Rod	.18	.20⅞	.23
Brazed tubing	.22⅞	——	.26¾
Open seam tubing	.21¾	——	.24¾
Angles and channels, plain	.22⅛	——	.25¼

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire —Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

18.75 per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	23c.	per lb. base
100 lbs. to 300 lbs. in one order	23½c.	" " "
Less than 100 lbs. in one order	25c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 21c. per lb.
Seamless Copper Tubing, 25c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	29	28	23	22	21	21	21	21	21	21	21	22	23	25	27	28

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 50%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	18½c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	17½c.	" "
" " " Rectangular sheets other than Sheathing	20c.	" "
" " " Rod	18c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 27½c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 28 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than.....	3in.	6in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.
	and including.....	12in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.	40in.
	in coils.									
No. 13 and heavier		34	34	36	36	36	36	39	39	39
" 14		34	34	36	36	36	36	39	39	39
" 15		34	34	36	36	36	36	39	39	39
" 16		34	34	36	36	36	36	39	39	39
" 17		34	34	36	36	36	36	39	39	39
" 18		34	34	36	36	36	36	39	39	42
" 19		34	34	36	36	36	36	39	40	43
" 20		34	36	36	36	36	38	41	42	44
" 21		34	38	38	38	38	40	43	44	50
" 22		34	38	38	38	40	40	43	47	51
" 23		34	38	38	38	40	40	43	49	52
" 24		34	38	40	42	42	42	45	51	54
" 25		36	39	41	43	43	43	46	53	57
" 26		36	39	42	46	46	46	51	55	61
" 27		36	40	44	48	48	49	54	58	64
" 28		36	40	46	48	49	49	56	62	67
" 29		38	41	48	50	52	52	61	67	72
" 30		38	42	50	52	56	62	69	72	77
" 31		43	47	53	58	63	71	74	77	83
" 32		45	49	57	61	69	77	91	90	95
" 33		47	51	60	65	73	84	91	100	110
" 34		50	55	62	70	78	91	103	110	120
" 35		..	65	70	80	90	100	115	125	..
" 36		..	80	90	100	115	120	135	..	..
" 37		..	104	114	129	144	159	174	..	..
" 38		..	124	139	154	169	184	204	..	..
" 39		..	144	164	184	204	224	..	..	..
" 40		..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	37
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb.	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4 per cent.	to No. 19,	B. & S.	Gauge,	inclusive	$0.60
6 "	" 19,	"	"	"	.70
9 "	" 19,	"	"	"	.85
12 "	" 19,	"	"	"	1.00
15 "	" 19,	"	"	"	1.15
16 "	" 19,	"	"	"	1.20
18 "	" 19,	"	"	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3½c. above the price of bullion.